


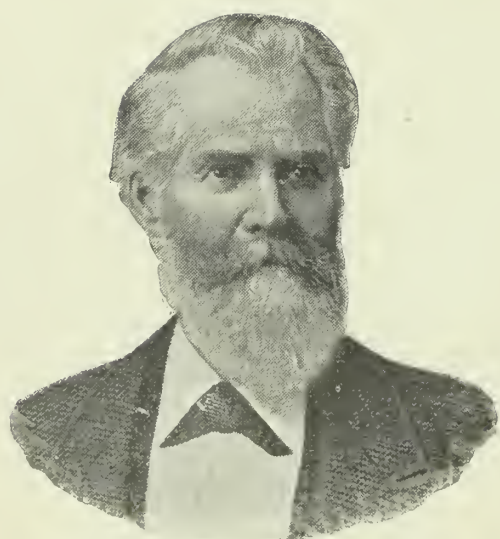
ANNUAL REPORTS
OF THE
SUPERINTENDENTS
Yellowstone National Park





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PHILETUS W. NORRIS.

LETTER

FROM

THE SECRETARY OF THE INTERIOR,

ACCOMPANYING

A report of the superintendent of the Yellowstone National Park for the year 1872.

FEBRUARY 4, 1873.—Ordered to lie on the table and be printed.

DEPARTMENT OF THE INTERIOR,
Washington, D. C., February 3, 1873.

SIR: I have the honor to transmit herewith, for the information of Congress, a copy of the report for the year 1872 of N. P. Langford, esq., superintendent of the Yellowstone National Park.

I am, sir, very respectfully, your obedient servant,
C. DELANO,
Secretary.

Hon. SCHUYLER COLFAX,
*Vice-President of the United States and
President of the Senate.*

REPORT OF THE SUPERINTENDENT OF THE YELLOWSTONE NATIONAL PARK FOR THE YEAR 1872.

On the 20th day of May last, I received from the Department of the Interior the following letter of appointment as the superintendent of the Yellowstone National Park:

DEPARTMENT OF THE INTERIOR,
Washington, D. C., May 10, 1872.

SIR: Congress, by an act approved March 1, 1872, has set apart a tract of land near the head-waters of the Yellowstone River, in the Territories of Montana and Wyoming, as a public park or pleasure-ground "for the benefit and enjoyment of the people." The reservation so set apart is to be known as the "Yellowstone National Park," and is placed under exclusive control of the Secretary of the Interior, and you are hereby appointed superintendent of the same, to act as such, and to carry out the provisions of the act of Congress, under such instructions as you may receive from time to time from the Department. It is not the desire of the Department that any attempt shall be made to beautify or adorn this reservation, but merely to preserve from injury or spoliation the timber, mineral deposits, and various curiosities of that region, so far as possible, in their natural condition.

As Congress has not provided any appropriation to carry out the purposes of the act, your appointment must be without pay until such time as an appropriation is made for that purpose. You are at liberty to apply any money, which may be received from

leases to carrying out the object of the act of Congress, keeping account of the same, and making report thereof to the Department.

You will forward also from time to time, as you may deem for the best interests of the service, reports of the condition of the park, and such suggestions relative to its management and care as your experience may dictate. So soon as regulations for the care and management of the park are prepared, they will be forwarded to you.

Very respectfully, your obedient servant,

B. R. COWEN,
Acting Secretary.

Hon. N. P. LANGFORD,
Saint Paul, Minnesota.

On the 25th of the same month, in response to my application therefor, more specific instructions were forwarded to me, and, in pursuance to the recommendations therein set forth, I immediately repaired to Fort Hall, near Snake River, in the Territory of Idaho, and there united with that part of Dr. F. V. Hayden's geological survey which, under the immediate direction of Mr. James Stevenson, his assistant, was charged with the exploration of the valley of Snake River to its junction with Henry's Fork, and thence along that stream to the head-waters of the Madison, at or near its union with the Fire Hole River, where, at the Lower Geyser Basin, it expected to unite with the main portion of the survey, which, under the charge of Dr. Hayden, was approaching the same point from the north. On our way thither we deflected from the main route, and visited the Three Tetons, so long known as the great landmarks of that portion of the country. With much difficulty the ascent of the loftiest of these singular mountains was effected by Mr. Stevenson and myself. The general topography of the country was corrected in many important particulars, and much needful information respecting its adaptation to utilitarian purposes obtained, to which, but for its connection with improvements which have an important bearing upon the interests of the park, as they will be fully presented by Mr. Stevenson in his report, I should scarcely allude.

The park is at present accessible only by means of saddle and pack trains, a mode of travel attended with many privations and inconveniences. As it is likely speedily to become an object of general interest, both at home and abroad, some safer and more convenient and expeditious mode of communication is desirable. A few years only can elapse before it will be reached by railroads; but until then it must be accommodated with good wagon-roads, or remain unvisited except by the few who are willing to endure the privation and exposure incident to horseback travel. The access to it from the south, by way of Snake River, is favorable to the cheap construction of good wagon-roads. The visitor can now approach the Geyser Basin with a wagon to a point fifty miles above the junction of Henry's Fork with Snake River. Thence to the basin is about eighty miles. The route passes over or through the main range of the Rocky Mountains, by either the Henry or Targee Pass, either one of which needs but little improvement to convert it into a remarkably fine road. For the entire distance, although in the midst of the mountains, such is the favorable configuration of the country that a road can be built without a grade to exceed fifty feet to the mile.

Another route, commencing at the same point on Henry's Fork, and following up the Middle Fork, is entirely practicable. The only obstacle is the obstruction offered by fallen timber for a portion of the distance, and this not a serious one. This route would be shorter than the other, and lead more directly to the Geyser Basin and Yellowstone Lake.

From the Geyser Basin to the Yellowstone Lake is a distance of about twenty miles. The country is rolling, and for a part of the distance filled with fallen timber. To make the circuit from the southwest estuary of the lake to the point ten miles below its foot, it would be necessary to approach both extremes by roads from the Fire Hole Basin. From the point where these roads intersect below the lake, a road should be constructed to Tower Falls, and thence directly to the Hot Springs on Gardiner's River, and in as near a direct line as possible from that point to the northern boundary of the park. A continuation of this road for fifteen miles from the boundary to the first settlements above Boteller's ranch would furnish all road improvements necessary to approach the park, either by way of Snake River or by the way of the Yellowstone.

Another road that is entirely practicable should be constructed from Gardiner River Springs, in a direct line across the park to the Lower Geyser Basin, a distance not to exceed forty-five miles.

These roads, when completed, would enable the visitor to reach all the great points of interest by carriage, and at any of these points horses would be provided for interior exploration. The opening of these roads would insure the early erection of large and commodious public houses at Mammoth Springs, Yellowstone Falls, Yellowstone Lake, and the Upper and Lower Geyser Basins.

Frequent application has been made to me during the past season by responsible persons for authority to improve these several routes by the construction of toll-roads, but I have invariably, with a single unimportant exception; (in which the applicants have not availed themselves of the privileges allowed,) declined to grant these applications, believing that inasmuch as this territory had been set aside and dedicated as a national park, the Government would prefer to construct its own roads, and make them free to all who wished to visit this wonderful region. It is, however, of the highest importance that roads should be constructed at an early day for the accommodation of tourists.

I am satisfied, from the numerous applications I have received for leases of property for hotel purposes at the leading points of interest, that if the park were rendered accessible by good wagon-roads, it would immediately prove a source of considerable revenue to the Government, and in a few years would largely repay any expenditures needful for its present improvement. Leases have been refused to all, simply because it was deemed necessary, first, to know, after fuller exploration of the park, what might be the intention of Congress respecting it. With a liberal appropriation now for roads, and a few other needed improvements, it is impossible to foresee what will be the future of this remarkable aggregation of wonders.

Leases have been sought for the construction of saw-mills in parts of the property where timber could be spared. The manufacture of lumber will prove a lucrative employment whenever the erection of public houses shall be commenced. In fact, with roads such as I have recommended, the business might be extended to reach the settlements of Montana, in most of which lumber commands a high price. A large portion of the park is covered with a heavy growth of pine timber, fit only for manufacture into lumber.

There is no land in the park suitable for agricultural purposes. Bunch-grass of a good quality, affording feed for horses, grows there in abundance, and will always abound in sufficient quantity for the use of tourists. No mines have yet been discovered, and it is the general opinion of

prospectors with whom I have conversed, that none will be found within the limits of the park.

A few months before the passage of the act of March 1, 1872, creating the park, several persons had located upon land at some of the points of greatest interest, with a view to establish a squatter's right of pre-emption, and they have since made application for such pre-emption of property, which embraces some of the chief attractions of the locality. Certainly their settlement upon these lands established no right of pre-emption or purchase in their favor. Any expenditures they may have made were at their own risk, especially if made after the passage of the act. A joint application of this kind from two of these persons (appended hereunto and marked A) has been referred to me by the Department. With no desire to impair any supposed rights these applicants may have, and with no personal objection to them as tenants, I still feel it a duty to recommend that their application be refused. To grant it would be to establish a precedent which would open the door for scores of similar applications, under which exhausting process the park would soon lose all its distinctive features of nationality. No sales of property within its boundaries should be made to any one; but whenever, in good faith, improvements have been made, with a view to future purchase or occupancy, such improvements should either be purchased of the persons who made them, or received in payment of the premises occupied by them, for such term as may, on full consideration, seem just and equitable. The realty of the land should be held alone by the Government, and be subject to such rules and regulations as may, from time to time, be adopted by the Department of the Interior. Several improvements for convenience of visitors had been made before the act of dedication was passed. These should be acquired by the Government, by making adequate compensation to the persons by whom they were erected, and these persons, if it should be their choice, should have a preference, upon equal terms, over other applicants for the rental of the premises they have improved.

The wild game of all kinds with which the park abounds should be protected by law, and all hunting, trapping, and fishing within its boundaries, except for purposes of recreation by visitors and tourists, or for use by actual residents of the park, should be prohibited under severe penalties. Laws prohibiting the cutting of timber, except in such localities as may be prescribed by the superintendent, should be adopted.

It is especially recommended that a law be passed, punishing, by fine and imprisonment, all persons who leave any fire they may have made, for convenience or otherwise, unextinguished. Nearly all extensive conflagrations of timber in the mountains may be directly traced to negligence in extinguishing camp-fires. In the timber regions, these fires are generally kindled against stumps and dry trunks of trees, by which, unless carefully extinguished, they often, after many days, communicate with the forest, and spread over immense tracts, destroying large quantities of valuable timber. Nothing less than a stringent law punishing negligence and carelessness, can save the extensive pine timber fields of the park from destruction.

As connected with this subject of legislation I would also recommend that the park be attached to Gallatin County, Montana, for judicial purposes, and that the laws of Montana be enforced within its boundaries. In order to make this recommendation effectual I would respectfully suggest that all that portion of the park not included in the boundaries

of Montana, but which is now in Wyoming, be added to Montana. This will embrace nearly the entire park.

The reason for such annexation is apparent, when it is considered that the park is only accessible from Montana. It is impossible to enter it from Wyoming. Attempts to scale the vast ridge of mountains on the eastern and southern borders have been made by several expeditions across the continent, commencing with that of Wilson G. Hunt, the chief of Astor's overland expedition in the year 1811. As late as 1833 the indomitable Captain Bonneville was thwarted in a similar effort, and after devising various modes of escape from the mountain labyrinth in which he was lost, he determined to make one more effort to ascend the range. Selecting one of the highest peaks, in company with one of his men, Washington Irving says:

After much toil he reached the summit of a lofty cliff, but it was only to behold gigantic peaks rising all around and towering far into the snowy regions of the atmosphere. He soon found that he had undertaken a tremendous task; but the pride of man is never more obstinate than when climbing mountains. The ascent was so steep and rugged that he and his companion were frequently obliged to clamber on hands and knees, with their guns slung upon their backs. Frequently, exhausted with fatigue and dripping with perspiration, they threw themselves upon the snow and took handfuls of it to allay their parching thirst. At one place they even stripped off their coats and hung them upon the bushes, and thus lightly clad, proceeded to scramble over these eternal snows. As they ascended still higher there were cool breezes that refreshed and braced them, and springing with new ardor to their task, they at length attained the summit.

As late as 1880 Captain Reynolds, failed in repeated efforts to cross this barrier, was obliged to make a *détour* of four or five hundred miles, to reach a point on the head-waters of the Yellowstone not fifty miles distant from his camp. While camped at the southeastern base of this formidable range of mountains, Captain Reynolds (Senate Ex. Doc. No. 77, Fortieth Congress, first session) wrote:

To our front and upon the right, the mountains towered above us to the height of from three thousand to five thousand feet, in the shape of bold, craggy peaks of basaltic formation, their summits crowned with glistening snow. It was my original desire to go from the head of Wind River to the head of the Yellowstone, keeping on the Atlantic slope, thence down the Yellowstone, passing the lake and across by the Gallatin to the Three Forks of the Missouri. Bridger said at the outset that this would be impossible, and that it would be necessary to pass over to the head-waters of the Columbia and back again to the Yellowstone. I had not previously believed that crossing the main crest twice would be more easily accomplished than the transit over what was in effect only a spur, but the view from our present camp settled the question adversely to my opinion at once. Directly across our route lies a basaltic ridge, rising not less than 5,000 feet above us, its walls apparently vertical, with no visible pass or even cañon. On the opposite side of this are the head-waters of the Yellowstone. Bridger remarked triumphantly and forcibly to me upon reaching this spot, "I told you you could not go through. A bird can't fly over that without taking a supply of grub along." I had no reply to offer, and mentally conceded the accuracy of the information of the "old man of the mountains."

As this portion of Wyoming Territory is thus entirely separated from the settled portions, which can only be reached by more than one thousand miles of travel, by way of Montana, Idaho, and Utah, and as there is not the most remote probability of any settlement in Wyoming in this region, except within the boundaries of the park, the annexation of the park to Montana for judicial purposes is an absolute necessity. It is not improbable that occasion may often render the services of the United States marshal necessary to eject defaulting or troublesome tenants. In such cases it would be impracticable to send a thousand miles for that officer, when, by the act of annexation, one could be obtained within a hundred. Aside from the delay which would thus be avoided, when haste might be really necessary, the expense would be so

greatly diminished as of itself to furnish a conclusive argument in favor of including the park within the boundaries of Montana. For further information upon this subject I respectfully refer to Washington Irving's "Astoria" and "Bonneville's Adventures," and to Captain Reynolds's official report.

The park can be visited any time between the last of April and the first of November, but it appears to the best advantage during the months of July, August, and September. Then the weather is warm and pleasant, storms rarely occur, and the forests, plains, and foot-hills are in full verdure. Tourists desirous of reaching the park by the most picturesque route will proceed by railroad to Corinne, Utah, where they can purchase their outfits for the trip cheaper and to better advantage than at any advanced point. The difference between a long and tedious stage-ride to Helena, and a ride on horseback from Corinne to Taylor's Bridge, is decidedly in favor of the latter, both as regards comfort and opportunities for observation. So much of the outfit as relates to food, groceries, and cooking-utensils, can be advantageously purchased at the stores in the vicinity of Taylor's Bridge, to which point, and on to Market Lake, the route lies over the main route to Montana.

From Market Lake to the park the country is wild and unsettled, and all provisions must necessarily be transported by pack-trains. Following the road from Market Lake to the ford on Henry's Fork of Snake River, a distance of thirty miles, the traveler from that point has nothing to guide him but a faint bridle-path. While passing over this part of the route, he will have many fine views of the Tetons, the great mountain landmarks of this region. Ascending Henry's Fork a distance of seventy miles, he will arrive at the frontier cabin of Gilman Sautelle and Levi Wurtz, on the shore of Henry's Lake, in which the fork takes its rise. In Messrs. Sautelle and Wurtz he will find men who, with all the better qualities of sagacious and expert mountaineers, unite fine moral natures and rare culture. Perfectly familiar with the entire region, these gentlemen will give the traveler all needful information as to his future journey of thirty-five miles to the Lower Geyser Basin, the first of the interesting localities in the park. In this basin there are many objects of rare interest. The geysers, though comparatively small, are very wonderful in the eyes of the visitor who first beholds them. So, also, are the hot springs; but they are merely a foreshadowing of the greater wonders of the Upper Geyser Basin, which is ten miles farther up the Fire Hole River.

The ride between the two basins is full of interest. The Upper Basin is the location of all the great geysers of the park yet discovered. No one has ever remained long enough in it to be able to detail with accuracy the number and size of all these wonderful water-spouts.

There are at least two thousand hot springs, large and small, in this basin, and of this number probably two hundred are geysers. The whole basin is enveloped in steam, and, seen at a distance, is like the approach to a cluster of manufactories. The geysers project water with terrific force, and in fabulous quantities, and in every conceivable form, to heights varying from 20 to 250 feet. These, seen in the rays of a mid-day sun, or in the beams of a full moon, are inexpressibly grand. Unlike any other scenery in the world, they amaze the beholder by their magnitude and novelty.

It is fifteen miles from this basin to Yellowstone Lake, over a path running through a pine forest, greatly obstructed the entire distance by fallen timber. Several beautiful cascades in the Fire Hole River may be visited on this part of the route. The lake is nearly 8,000 feet

above the ocean. It is twenty-five miles in length, embosomed amid mountains, gemmed with green islands, unique in form, and surrounded on all sides by hot springs of great variety, number, and beauty. Jets of steam may be seen issuing from the hot springs, from the islands, even from the bosom of the lake itself. Some of the loftiest and most inaccessible mountain-ridges on the continent lift their snow-clad summits in the immediate vicinity. The scenery is colossal and full of savage grandeur.

Following the river from the foot of the lake for the distance of nine miles, the visitor reaches the locality of Sulphur Mountain, the Mud Geyser, the Mud Volcano, and the Blowing Cavern, all objects of separate interest, and presenting novelties of rare and curious character.

Ten miles farther down the river are the two great cataracts, and the Grand Cañon, of the Yellowstone, perhaps the most stupendous elements of scenery in the park. The upper fall is 115 feet in height; the lower, which plunges directly into the cañon, is 350 feet, and the cañon itself, varying from one to three thousand feet in depth, is forty miles in length, and for the whole distance presents to the eye the most wonderful chasm in the world. Jets of hot vapor issue from its sides, and color them with the most brilliant colors of nature. From its profound depths stars are visible in the day-time. Lieutenant Doane, who, in 1870, succeeded in reaching the bottom of the cañon, at a point where the walls are nearly 3,000 feet in height, in his official report (Senate Executive Document, No. 51, Forty-first Congress, third session) says: "It was about 3 o'clock p. m., and stars could be distinctly seen, so much of the sun-light was cut off from entering the chasm."

About eighteen miles farther, and at a point of one mile divergence from the cañon, the beautiful fall of Tower Creek, with its grotesque surroundings, meets the eye; and, twenty-five miles below this point, the most wonderful hot springs of Gardiner's River, with all their variety of beauty and novelty, assert their claims to be considered the most remarkable of the curiosities of the park.

Thus, in a circuit of perhaps ninety miles, the greatest attractions of the park may be seen, and, at the close of the tour, the visitor is within seventy-five miles, over a good road, of Fort Ellis, and the beautiful town of Bozeman, in Montana Territory.

It is impossible, in this report, to convey the faintest idea of the grandeur of the mountain and river scenery everywhere present on this ride. We venture to say that there is not in the world, within the same limit, so many wonderful freaks of physical geography, so much to amaze and delight the beholder.

The trip thus finished through the park, the traveler, at any time before the middle of August, may fitly complete it by proceeding from Bozeman to Helena, through the beautiful valleys of the Gallatin and the Upper Missouri, thence by coach through a highly picturesque country one hundred and forty miles to Fort Benton, where, in a fine river-steamer, he may complete the trip by a sail of six or seven days, of two thousand miles down the Missouri, to Omaha, or to the junction of the Northern Pacific Railroad, whence he may reach the sea-board by rail.

I regard the explorations of this region as but just commenced. New wonders are continually presenting themselves. Jets of steam as yet unvisited are seen in all directions while passing through the park, many of which indicate the location of very extensive groups of springs. Columns of vapor, apparently 500 feet in height, seen Lieutenant Doane and myself on my first visit in 1870, while on one of our mountain expeditions, have not as yet been visited. Mr. Stevenson

during the past year discovered, near the head of Snake River, a basin which he believed, from casual observation, to contain nearly as many springs and geysers as the Lower Geyser Basin on the Fire Hole.

A party of tourists from Bozeman also discovered a similar basin between the Mammoth Springs at Gardiner's River and the Fire Hole Basin. The whole country is full of interest, and presents to tourists a rare opportunity for exploration, and to scientific men a wonderful field of investigation.

The destructive and reproductive agencies at work in all this region are not the least marvelous of its phenomena. The two years which have elapsed since the first discoveries in this region have wrought marked changes. In that period old geysers have ceased to act, and new ones have been produced; small geysers have increased in size, while large ones have decreased in volume. The same may be said of the springs. Many that were clear two years ago are now muddy caldrons, their contents boiled down to thick paste. The mud volcano, which on my first visit was in active operation, had entirely disappeared, and when Professor Hayden visited the spot the following year, its only remains were hillocks of mud and a shapeless hole thrice the former size of the crater. Large pine trees, 125 feet high, which grew near the edge of the crater in 1870, had been completely engulfed by it at the time of its destruction, before the summer of 1871.

The reproductive power of the waters of the Mammoth Springs at Gardiner's River is very wonderful. This is the only group of calcareous springs yet discovered in the park. All the others are siliceous. The different pools formed by water of these springs in its descent of the mountain, the frozen cascades, the corrugated borders, all most exquisitely and delicately formed of lime deposit, may, if broken up for specimens, or worn out by age, or abandoned by the falling water, all be speedily restored to their beauty by exposing for a few days the injured parts to the action of the waters.

The whole hill-side may by this process be improved and made to assume any form, at the pleasure of the most fantastic fancy. During the past summer little ornaments of wire, baskets, and other objects, wound with cloth, have by suspension in these springs, for a period of eight or ten days, been taken therefrom most beautifully incrustated with a coating of crystallized lime, pure as alabaster, of half an inch in thickness. At any point, by penetrating the crusted surface made by the flowing of these springs, a vapor bath is easily obtained.

I cannot close this report without returning my thanks to Colonel Baker, commandant at Fort Ellis, and to Captain Putnam, commandant at Fort Hall, for their kindness in furnishing camp equipage and guns for myself and my assistant, and for many other attentions; to Professor Hayden, for transportation and for unnumbered personal kindnesses; and to Captain Stevenson and the members of the United States geological survey, for the assistance rendered by them upon all occasions, and to the Union Pacific and Central Pacific Railroad Companies for the courtesy of free passes for myself and assistant. Their liberality will not soon be forgotten. My assistant, Mr. Charles L. Spencer, will also accept this public tender of my thanks for the able services he rendered on a trip which was both protracted and toilsome, and afforded him no other recompense for his assistance than an opportunity to see the wonders of the park.

I desire, also, to add my testimony to that of Dr. Hayden, in praise of the accuracy and artistic skill with which that accomplished artist, Thomas Moran, has depicted the grandeur, both in general appearance

and coloring, of the Grand Cañon of the Yellowstone. By some who have seen this picture its coloring has been criticised, because they could not realize that such a remarkable natural combination of colors was possible. But in this respect the painter's tints cannot equal the original. Mr. Moran has but approached it, simply for the reason that the coloring of nature is more brilliant than painting can be. The picture is in no degree exaggerated. It is the work of a very accomplished artist, and reflects the highest credit upon his skill and accuracy. All who have seen both the cañon and the painting will readily agree that in grandeur, in coloring, in the number of its steam jets, and in its general effect, it is not overdrawn. But this is only one of the wonders of that great region of marvels. Could all be portrayed with the same faithfulness, and made to adorn the walls of our Capitol, how greatly would they exceed in grandeur and vastness our ordinary art decorations.

Nothing has been, nothing can be said, to magnify the wonders of this national pleasuring-ground. It is all and more than all that it has been represented. In the catalogue of earthly wonders it is the greatest, and must ever remain so. It confers a distinctive character upon our country, greater than that of Niagara, Yosemite, or Mammoth Cave, though each of these is, in itself, without parallel. But here, the grandest, most wonderful, and most unique elements of nature are combined, seemingly to produce upon the most stupendous scale an exhibition unlike any other upon the globe. It should be sustained. Our Government, having adopted it, should foster it and render it accessible to the people of all lands, who in future time will come in crowds to visit it.

Very respectfully, your obedient servant,

N. P. LANGFORD,

Superintendent Yellowstone National Park.

Hon. C. DELANO,

Secretary of the Interior, Washington, D. C.

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IDAHO MONTANA AND WYOMING
TERRITORIES

From Surveys made under the direction of
F.V. HAYDEN U.S. Geologist
And other authorities

871

Preliminary Map for Field use by F.V. Hayden 1872
Compiled and drawn by E. Hergsheimer
Heights are in Feet.

Miles 0 10 20 30 40 50

75 W 12

R E P O R T
Upon the
YELLOWSTONE NATIONAL PARK,
To the
Secretary of the Interior,
By
P.W.Norris,
Superintendent,
For the year, 1877.

REPORT

ON THE

YELLOWSTONE NATIONAL PARK.

NORRIS, MICHIGAN, *October 20, 1877.*

SIR: In accordance with your instructions, based upon the act of Congress, approved March 1, 1872, setting apart the Yellowstone National Park, and providing for the management thereof, I have the honor to submit the following report.

Upon receipt of my appointment as superintendent of the said park I appointed Mr. J. C. McCartney, the pioneer proprietor of the Mammoth Hot Springs Hotel, resident assistant. I soon after published in the Norris Suburban, (a newspaper widely circulated in the West,) a copy of the act dedicating the park, your rules and regulations for its management, notice of my own and my assistant's appointments, and a spirited appeal to my old mountain comrades, tourists, and the general public, to assist in checking vandalism in the wonder-land, sending hundreds of extra copies to presses and parties in the West.

As a practical mode of attracting general attention I also had a large number of spirited cautions against fire and depredations in the park printed upon durable cloth and affixed to trees, and otherwise at prominent points of interest therein and the adjacent places of resort.

I also, in the Suburban and other sheets, regularly published items of interest relating to my explorations in the park and the routes thereto.

The published reports of Langford, Everts, Hayden, myself, and others having more clearly demonstrated the existence of matchless wonders within the park than any direct or practical route of reaching it, I sought to explore a new one by ascending the Yellowstone River, its natural outlet.

Leaving Washington in April, and Norris in May, passed the Sacred Calumet or Pipe-stone quarry of Dakota *en route* to Bismarck. Thence, after unusual delays upon steamboat ascending the Missouri, reached Fort Buford, at the mouth of the Yellowstone, June 18. Unfortunately for the Government, the public, and the *present* popularity of the Yellowstone route to the National Park, Commodore Coulson failed to secure contract for the immense Government transportation thereon. He thus hauled off the Josephine, the first boat of recent years to ascend the Yellowstone, which, in 1875, reached the highest point yet attained, at Baker's battle-field near the mouth of Clark's Fork; the Fart West, which carried the wounded after Custer's and Reno's defeat from the mouth of the Little Big Horn River, in 1876, the intrepid Captain Grant Marsh, commanding on both occasions; and also other boats and officers fitted or qualified for the trade.

This left the Yellowstone Transportation Company with a totally inadequate supply of necessary light draught. powerful steamboats, or officers of experience on that route.

I am explicit upon this point, as the all-important one, which, after much of a season's unfortunate experiment of running huge, loggy Ohio and Mississippi packets upon the large and beautiful but unknown, uniformly rapid, and often rocky Yellowstone, terminated in an amicable arrangement by which much of the immense public and private freightage thereon was speedily done by the first-named and similar boats and officers.

Despite the most gentlemanly treatment by the officers of these large boats, so annoying became the delays that I left Tongue River post, with two comrades, upon Indian horses captured at General Miles's Rosebud fight, ascending the Yellowstone on the north bank to the Big Horn, and up the latter and the Little Big Horn to Custer's field, at disinterment of the officers' remains. Thence returned to the Yellowstone, and, through terrible storms of rain and hail, ascended it to and through the Snowy Gate of the mountains, Bottler's Park, and the second cañon to the Mammoth Hot Springs, in the National Park.

Thence made a brief visit to Forts Ellis and Bozeman for consultation with the leading military officers and citizens in relation to invalids and tourists at the bathing-springs, and, securing an outfit, returned to Bottler's.

Anxious to explore the nearly unknown northern portions of the park and its approaches, I crossed to Emigrant and over the basaltic terraces bordering a chain of lakes to Fitzgerald's lonely ranch, at the foot of Dome Mountain.

Near these lakes, the basaltic terraces back of Bottler's and in Trail Creek Pass are long, often parallel, lines of small rude stone-heaps, and near the latter many mining shafts and drifts of some prehistoric race for a rare, wavy, ornamental rock, the first evidence of ancient mining discovered in these regions. From their adjacent burial-cairns, discovered by me in 1870, specimens of this rock, arrow-heads, and other implements and tools of obsidian or volcanic glass, were found and sent to the Smithsonian Institution, hoping for future interesting explorations.

The mountain snows were unusually deep and slow in melting, but by following an ancient game and Sheepeater Indian trail some miles from and at least 2,000 feet above the river in the second cañon, I crossed Dome Mountain, descending to the river opposite Cinnabar Mountain. Thence ascended the valley, passed several active and the crumbling craters and cones of countless extinct hot springs, often capping the basaltic cliffs hundreds of feet in height, like (save a more yellow tinge in weathering) the most ancient and elevated of those at the Mammoth Hot Springs, and doubtless of a common age and character, to Gardiner River and Bear Gulch. The latter enters the Yellowstone through a yawning chasm, deep, through the hot springs formation and basaltic lava, into the underlying gold-bearing rocks, upon a lode in which four miles up the gulch (probably just without the park) is an excellent arrastra amid promising lodes and placers. The initial point of the park boundaries at the confluence of the Yellowstone and Gardiner Rivers is in a deep eroded valley, elevated but a few feet above their rocky beds, a good permanent starting-point for survey of the boundary-line, which is excellent for a few miles in the Yellowstone Valley to the west, but to the east it soon enters and continues along a towering, most of the year snowy, range, gashed from one to three thousand feet deep by Bear Gulch, Crevice, Slough, and Soda Butte Creeks, and their eroded side cañons. A narrow belt near their mouths *within* and much more *without* the park contains probably valuable deposits of gold, silver, copper,

and other valuable minerals, amid basaltic buried petrified forests of matchless wood opal, amethyst, chalcedony, &c.

These I explored, as also the mining-camps at heads of the Little Rosebud and Clark's Fork, (the latter giving name to the whole mining region,) and in pursuance of a long-cherished desire sought a passage through the Big Horn or Shoshone Sierra Range to the main Yellowstone below.

Failing on my route up to find a guide or even a comrade from the Crow Indian agency from below, I now employed Mr. Adam Miller to guide me from above down the Little Rosebud.

Quickly crossing a sharp divide fully 8,000 feet high and from his mining-camp at the head of Soda Butte Creek, we in four miles descended to about 7,000 feet at the famous Red Trout Lake. This is the head of Slue Creek running south into the East Fork, thence in the same park without an intervening ridge to the head of the Little Rosebud or Stillwater running northerly into the main Yellowstone. We found neither falls, narrow cañons, nor other serious impediments; in fact, the descent and pass many miles through the main divide so unexpectedly favorable, that I decided to return through and complete its exploration *en route* home, after tour of the park.

But before returning we ascended a snowy peak of the main divide near the pass, and August 2 got an open, clear view of the Slue Creek Valley, both of the Yellowstones near their forks, Tower Creek Falls, and Mount Washburn looming grandly in the southern background. To the north a deep, narrow, but direct and apparently fine open pass connecting Slough Creek with the Rosebud, and through the last crest of the range to the treeless foot-hills, and timber-fringed valleys of the Rosebud, Stillwater, and main Yellowstone beyond the Crow Indian agency, to limit or the horizon in the dark Bull Mountain.

After finding that my injury at Tower Falls would compel my return down the river in a boat, I employed Mr. Miller to explore the pass thoroughly, and report promptly and fully, which the unexpected Indian raid has prevented, in time for this report. But I retain great confidence that this pass, cutting off, as it does, nearly one hundred miles in distance and several cañons and mountain-spurs along the Upper Yellowstone, will prove, to at least the East and Clark's Forks mining regions, much if not all of the year, exceedingly valuable, if only for pack-trains, with strong promise of a wagon-route during at least the summer. This, in addition to ordinary traffic, would give tourists a direct route from the navigable waters of the Yellowstone past the Crow agency, magnificent mountain scenery and valuable mines through the petrified forests to the forks of the Yellowstone, and great central point of the "wonder land."

Descended the Soda Butte, East Fork, and main river to near Trail Creek Pass below Bottler's, to meet General Sherman, and returned with him to Hot Spring Creek, near the forks of the Yellowstone. Anxious to explore a route between the Grand Cañon and Mount Washburn, I started alone at daybreak, pushing rapidly to Tower Falls. There the roar of waters, with fumes of sulphur from the Grand Cañon, frightened my horse to backing and the breaking of a stirrup-strap, hurling me headlong through a clump of service-bushes many feet down a precipice upon the jagged lava-rocks below, breaking compass, watch, and field-glass, and rendering me temporarily insensible. Though partially recovered before arrival of the General and party, the injury to my nearly broken neck and back, my arm, and an old shoulder-wound, was so severe as to compel my most reluctant return to the Mammoth Hot Springs.

Greatly benefited by two days' bathing there, I was with great difficulty enabled to reach Bottler's, and thence in a small Mackinaw boat descended the river through the Gate of the mountains, and some 400 miles to the steamboat Far West, below the mouth of the Big Horn, and upon her to Bismarck; thence returned via the Northern Pacific Railroad to Duluth, and the Great Lakes to Detroit, thence to my suburban home, after nearly four months of constant, toilsome, and often dangerous travel, and am still suffering from, I fear, a permanent injury to my shoulder and spine.

I heard the first tidings of Gibbon's fight at the Big Horn, the Nez Perces raid into the Geyser Basin, and first massacre of tourists in the Park, at Duluth, and still later of the burning of Henderson's ranch, the bridges, and killing of other tourists at the Mammoth Hot Springs.

From General Sherman's extremely weak escort of only five men, beside a like number of my citizen comrades, it is evident that he did not anticipate incursion of the Indians so closely behind him, nor did others. Even after, as is now known, the Nez Perces were slaughtering tourists at the Geyser Basin, no tidings had reached my assistant at the Mammoth Springs, who then wrote me that tourists were pressing on to the

believing the Indians were descending Snake River. He subsequently did all in his power to assist the wounded and bury the dead, narrowly escaping with his life after loss of his horses, buildings, &c.

Deeply as I regret my absence, I was, even aside from my injury, in no situation to have rendered very material additional assistance, as I was totally without park police, or personal escort, authority to raise, or funds to pay for them, or even an official salary, obligation to, or expectation of a prolonged stay in the park this year. I understood my season's duties to be exploration of the Yellowstone River, a new pass to the East Fork, arousing public sentiment against destruction of animals and wonders in the park, with a rapid review of it, for the latest knowledge attainable for intelligently recommending practical legislation and rules for its future management. This, despite all obstacles and mishaps, I have mainly accomplished.

The portion of the park which I failed to review this season is that well known to myself and others; much of what I did visit, little known, and yet a knowledge of it necessary for appropriate legislation. I also deem my exploration of the pass to the Little Rosebud and the entire length of the Yellowstone River, by boat or on horseback, as being to myself and the public, for many reasons, extremely valuable.

The location, size, and general features of the Yellowstone National Park, and its two old routes of approach, are, from many public and private accounts, so well understood as to require few comments, other than all admit the existence there of an unrivaled concentration of wonders, and also the wisdom of Congress in promptly setting it apart as a permanent health and pleasure resort, and placing it under the control of the Interior Department. They, however, with equal unanimity press the necessity for additional legislation, and especially for speedy appropriation of funds to survey and plainly and permanently mark its boundaries, and also salary of a superintendent to justify his residence there, and efforts to protect the wonders, open roads, and assist tourists with information and guidance.

When returning from a fruitless effort to reach the geysers in spring of 1870, I at Bottler's met Adam Miller, who after subsidence of the floods which had disabled my comrade and forced our return, ascended the main river and East Fork, and discovered the Soda Butte and Clark's Fork mines.

This was months in advance of Washburn, Doan, and comrades, the first in any sense official explorers of the park; and nearly two years before it was legally declared such, and yet during all this intervening time (save when temporarily driven out by Indians or starvation) himself and other occupants of these mines have labored in utter ignorance of whether they were living under the usual regulations of mining camps, or trespassers upon a national pleasure-park.

There is now one valuable argentiferous galena-smelter, owned by spirited Montana capitalists, and some thirty or forty resident gold-placer miners in this annoying situation.

Besides, the laws and customs of our people are too well established in reference to mines and miners to anticipate revenues or assistance from them, other than perhaps construction of a substantial highway and bridges, where, and under such regulations as the superintendent of the park or the Secretary of the Interior may prescribe.

Should these mines develop as they now promise these improvements can doubtless be secured, thus greatly counterbalancing the annoyance of a fifty-mile line of ordinary traffic through even the border of the park. But the entire character of ownership and development of all these mining interests are so dissimilar to the anomalous rules and regulations necessary for the management of a wild national pleasure-resort, that antagonism and annoyance so arises and increases at every phase of their contact that the permanent good of both absolutely requires a speedy survey of the boundaries of the park, followed by either a recession or special rules for management of these, probably the only valuable mines that will ever be found even partially within the park.

As C. J. Barronette had, at great danger and expense, constructed a bridge at the forks of the Yellowstone, where indispensable for access to the mines or of travel in much of the park, and J. C. McCartney had, with much expense and cost, constructed hotel, bath, and other accommodations at the Mammoth Hot Springs many months before the setting off of the park, and have constantly and more beneficially to the public than to themselves held peaceable possession of them until the recent Indian raid, it seems but fair they should either be paid a reasonable remuneration for surrender of their improvements, if taken by the Government, (which I do not recommend,) or allowed a fair preference in securing ten or twenty years' leases for bridge and hotel rights at their respective localities.

These are all the permanent occupants or improvements, in addition to the above-mentioned mining interests within the park; the rude cabins, corralls, &c., of ranchmen upon the East Fork and Soda Butte, should, without expense, be utilized by the Government in leases for like purposes. There should also be ten or twenty years' leases for hotel accommodations at each of the Fire Hole Basins, the Great Falls, and foot of Yellowstone Lake, with yacht and ferry license at the latter place.

The early interesting and truthful reports of Professors Hayden, Comstock, and others of the beautiful and grand geysers and other hot-springs and salzas, with their snowy white, or beautifully-tinted and scalloped borders and terraces, elsewhere unequaled by nature, and inimitable by art, still fails in description of the Lion, Lioness, and many other geysers then unknown, and being constantly discovered by myself and others. Besides, as *then* conjectured and *now* known, although uniform and permanent in general character, there are constant and often great changes in the volume of water, power, and periods of eruption and repose of many of the geysers, as well as in their birth, growth, deca-

dence, death, and decay. This is especially evident at the Mammoth Hot Springs, the crumbling and all-eroding effects of the elements, adding the halo of ceaseless contrast and change to the other weird wonders of the "fairy land."

This assures constant interest in new view and description of and anxiety to revisit it, especially by those benefited by bathing in any of the countless medicinal springs.

The lamentable Indian raid, burning of houses, bridges, and massacre of innocent tourists within the park, soon after my leaving there, is as anomalous as unexpected; the first, and probably the last of the kind, as it is wholly aside from all Indian routes, and only chosen in the desperation of retreat by the Nez Percés, who have acquired sufficient civilization and Christianity to at least overpower their pagan superstitious fear of *earthly* fire-hole basins and brimstone pits.

Doubtless many interesting specimens of opalized wood, chalcedony crystals, &c., have, without serious injury to the park, been removed therefrom to the public and private museums or cabinets of the world, greatly adding to a correct knowledge of, and desire to visit, the matchless "wonder-land."

But millions of specimens have been obtained by the grossest vandalism; many of the inimitable scalloped cones and turbaned borders of geysers, salzas, and springs, specimens of centuries of nature's matchless handiwork, demolished for mere fragments which, as such, were not worth—and often not carried away. Careless use of fire has also destroyed vast groves of timber, seriously increasing the necessity and adding to the cost of constructing roads and bridle paths.

Owing to the isolation of the park, deep amid snowy mountains, and the superstitious awe of the roaring cataracts, sulphur pools, and spouting geysers over the surrounding pagan Indians, they seldom visit it, and only a few harmless Sheep-eater hermits, armed with bows and arrows, ever resided there, and even they now vanished. Hence in no other portion of the West or of the world was there such an abundance of elk, moose, deer, mountain sheep, and other beautiful and valuable animals, fish and fowl, nor as ignorant, or as fearless of and easily slaughtered by man as in this secluded and unknown park but seven years ago. Most of the larger animals would stupidly gaze at man stalking erect as an added wonder in the "wonder-land" until too often wantonly slaughtered, while the utter want of salary prevented my worthy predecessor, Hon. N. P. Langford, from residing there or seriously checking.

From the unquestioned fact that over 2,000 hides of the huge Rocky Mountain elk, nearly as many each of the big-horn deer and antelope, and scores if not hundreds of moose and bison were taken out of the park in spring of 1875, probably 7,000, or an annual average of 1,000 of them, and hundreds if not thousands of each of these other animals have been thus killed since its discovery in 1870.

As comparatively few of them were slain for food, but mostly for their pelts and tongues, often run down on snow-shoes and tomahawked when their carcasses were least valuable, and merely strychnine-poisoned for wolf or wolverine bait, the amount of most wholesome, nutritious, and delicious food thus wantonly destroyed is simply incalculable.

My appeals to the hunter mountaineers have been quite uniformly met with the frank avowal that while Government provided no one to protect its animals and wonders, nearly all of them alike slaughtered and vandalized; that with a firm business effort of a superintendent and assistants to protect, all will abstain or find it too hot to long remain

there—and I believe them. For with all their faults and peculiarities is blended an enviable standard of truth, honor, and genuine pride in their own reputations and that of the matchless wonders of their mountain homes, which, by manly treatment and proper rules uniformly enforced, would render them its steadfast protectors instead of ruthless despoilers.

With the best-informed mountaineers, I deem the game in most of the park, especially along the main routes of travel, as too much decimated to justify extra efforts for its protection west of the Yellowstone Lake, River, and Grand Cañon. But the wild eastern portion between them and the impassable snowy crests of the Shoshone Sierra, or Yellowstone range, from the base, say thirty miles, along the East Fork of the Yellowstone south, say fifty miles, to apex of a triangle at the head of the lake, contains fewer prominent wonders and more large valuable game-animals than other portion of the park or of the mountains.

Here is still a herd of three hundred or four hundred of the curly, nearly black bison, or mountain buffalo, with thousands of elk, deer, moose, antelope, bighorn and woolly sheep, beaver, and other beautiful and rare animals valuable for food, pelts and furs, while, inclosed by impassable natural barriers elsewhere, only during the deep snows of winter occasionally visit the deep-sheltered grassy valley of the East Fork—from two to five miles wide.

There two or three spirited, intelligent herdsmen might (in addition to profitably rearing domestic animals) also thoroughly protect and, by capture of the young, gradually domesticate any desired number of them.

These, by practical rearing, and by sale of the young to zoologists throughout the world, and by judicious slaughter and sale of their flesh, pelts, and furs, and also of those still wild, might render them permanently attractive and profitable to the park and to the nation in its management. That this is not visionary, but eminently practical, the herds of Major Pease and others, of bison, elk, deer, and woolly sheep, mainly originally captured in the park and now roaming peacefully with domestic animals without inclosure, fodder, or other care the whole year, is proof beyond cavil or doubt.

By proper laws and leases the rocky islets of Alaska produce a fair and reliable revenue from the skins of the arctic seal, when elsewhere practically extinct; why not thus utilize a waste corner of our—in size, elevation, and wonders unrivalled—National Park by timely protection of our rarest animals, our national bird of valor, and our matchless speckled trout?

Surely they might here prove a perpetual attraction to the eye, under proper regulations, to the chase, and their flesh judiciously slaughtered, to the palate of the countless health and pleasure seekers, when elsewhere unknown, save in the natural histories of extinct species. Within a decade the buffalo, the bison, and, in fact, the most of these larger animals will be extinct or extremely rare elsewhere in the United States; and if our people are ever to preserve living specimens of our most beautiful, interesting, and valuable animals, *here*, in their native forests and glens of this lofty cliff and snow encircled “wonderland,” is the *place* and *now* the *time* to do it.

A pressing necessity is the construction of a wagon-road from the Mammoth Hot-Springs, via the Cañon Falls and cascades of the East Fork of the Gardiner River, Tower Falls, Mount Washburn Cascades, Yellowstone Falls and Lake, and to the Fire-hole Basins, to where the Nez Percés recently entered the park upon the road from Henry’s Lake.

This, in a distance of something less than a hundred miles would con-

nect nearly all the main points of interest within the park, the two old entrances at their termini, a new one through the Togwatee Pass and Wind River Valley, as proposed by Capt. W. A. Jones and Prof. Theo. B. Comstock in the interesting and valuable report of their explorations of 1873, and also my proposed one from near the forks of the Yellowstone to the Stillwater and navigable portion of the Yellowstone.

There is also necessity for speedy construction of a bridle-path through the pass from the Little Rosebud or Stillwater to the Clark's Fork and Soda Butte Mines, thence through the petrified forests, from Amethyst Mountain to Pelican Creek and foot of Yellowstone Lake, thence around it, with a branch to the Shoshone Lake, Geyser Basin, and old Faithful Geyser in the Upper Fire-hole Basin.

Also a very important bridle-path cut off by the route which I explored in 1875, from the forks of the Firehole via Gibbon's Fork, Cañon, Falls, Red Geyser Basin and Pass, and the falls of the Gardiner River, to the Mammoth Hot Springs. As of these roads and bridle-paths, only the miners (which I hope to arrange with them to construct and repair from the forks of the Yellowstone) cross the main river, no long, but many short, and some tolerably elevated, bridges will be required; but some long causeways, especially in the miry, often nearly impassable, Upper Firehole Valley, much earth and little rock excavation. Timber and rock material usually abundant, and plain but substantial improvements, with the all-important practical selection of routes not necessarily very expensive.

The necessity is evident for an appropriation to survey the boundaries, and continue explorations of the park, construction of these roads and bridle paths, and salary to insure a superintendent of energy and practical knowledge, and intrusted with discretionary power to under proper restrictions, manage these varied and important interests of the nation in the park.

An ambitious scientific signal-officer at the Mammoth Hot Springs or the Geyser Basin, or both, might, with little additional duty or expense, greatly aid science in solving many interesting and practical questions connected with the origin, character, duration, and decadence of each of these various classes of hot springs, the degree of their connection with the earth's internal fires, and their combined influence upon the climate of the park.

Notwithstanding the unavoidable great length of this first general report of the situation of the park since its legal existence, so important to its development and enjoyment is the opening of the Yellowstone River route, that I add a brief statement of what I deem practical facts in relation thereto.

We are now in the midst of serious and wide-spread Indian difficulties of cost and duration uncertain, but not the pending military necessities or final results, one of the most important of which is the speedy and permanent opening of the great natural Yellowstone route to the settled portions of Montana and the park, of the feasibility of which I have all confidence, for the following reasons:

The Missouri, as is well known, has been for many years navigated most of the season to Fort Benton, and all of it to Carroll:

From a personal knowledge of these streams many years ago—explorations of most of both of them in 1870 and 1875, boating the whole of the Yellowstone one way, part of it the other, and the balance upon horseback this season, the views of old trappers and bull-boat voyagers and of recent steamboat and military officers, basis for accurate conclusions certainly equaled by few, if any, and excelled by no man living—

thus view their relative and actual merits for navigation. As compared with the Missouri above their junction, I deem the Yellowstone less crooked and muddy, with a *somewhat* narrower channel and *much* firmer banks, a more uniformly rapid current, but neither falls nor long and heavy rapids as has the Missouri below the gate of the mountains, usually carrying nearly as much water, and often, though not always, from higher snowy mountains,) boating-stage later in the season; bluff and bar impediments to navigation more rocky and changeless, and hence soon better known, avoided, or permanently improved.

With moderate appropriation for removal of huge bowlders in the Volf, Buffalo, and a few other rapids, and with the convenient rock and timber obstructing a few side shutes, powerful light draught steam-boats, like the Josephine or Far West, can with safety and profit run nearly or quite all of the season to the mouth of the Big Horn.

Boats like the Rosebud could ascend to at least Baker's battle-field, and, with further improvements of the channel, and perhaps a smaller, yet serviceable, class of boats to the mouth of the Stillwater, if not, indeed, to Benson's Landing, at the very gate of the mountains, within sixty miles of the Mammoth Hot Springs in the park. This landing is but twenty-two miles by the open Bozeman Pass and excellent road from Fort Ellis at the head of the fertile Gallatin Valley, extending to the Three Forks of the Missouri and central point of the valuable mines and valleys of Montana. Hence, even liberal appropriations for improvement of the Yellowstone would be annually repaid to the Government in the cost of transportation alone to an entire chain of forts, besides speedily assuring a border of prosperous settlements, (save upon the Crow reservation, and ere long that also,) and permanently solving the Indian question, through the very heart of their most beautiful and valuable game regions.

The permanent opening of this great natural route from the north and east, and the assured extension of the Northern Utah Road into at least the Snake River Valley from the south, will develop rivalry in excursion-tickets from all the important cities of the nation, inviting teeming hordes of tourists to the bracing air, the healing bathing-pools, and matchless beauties of the "wonder-land."

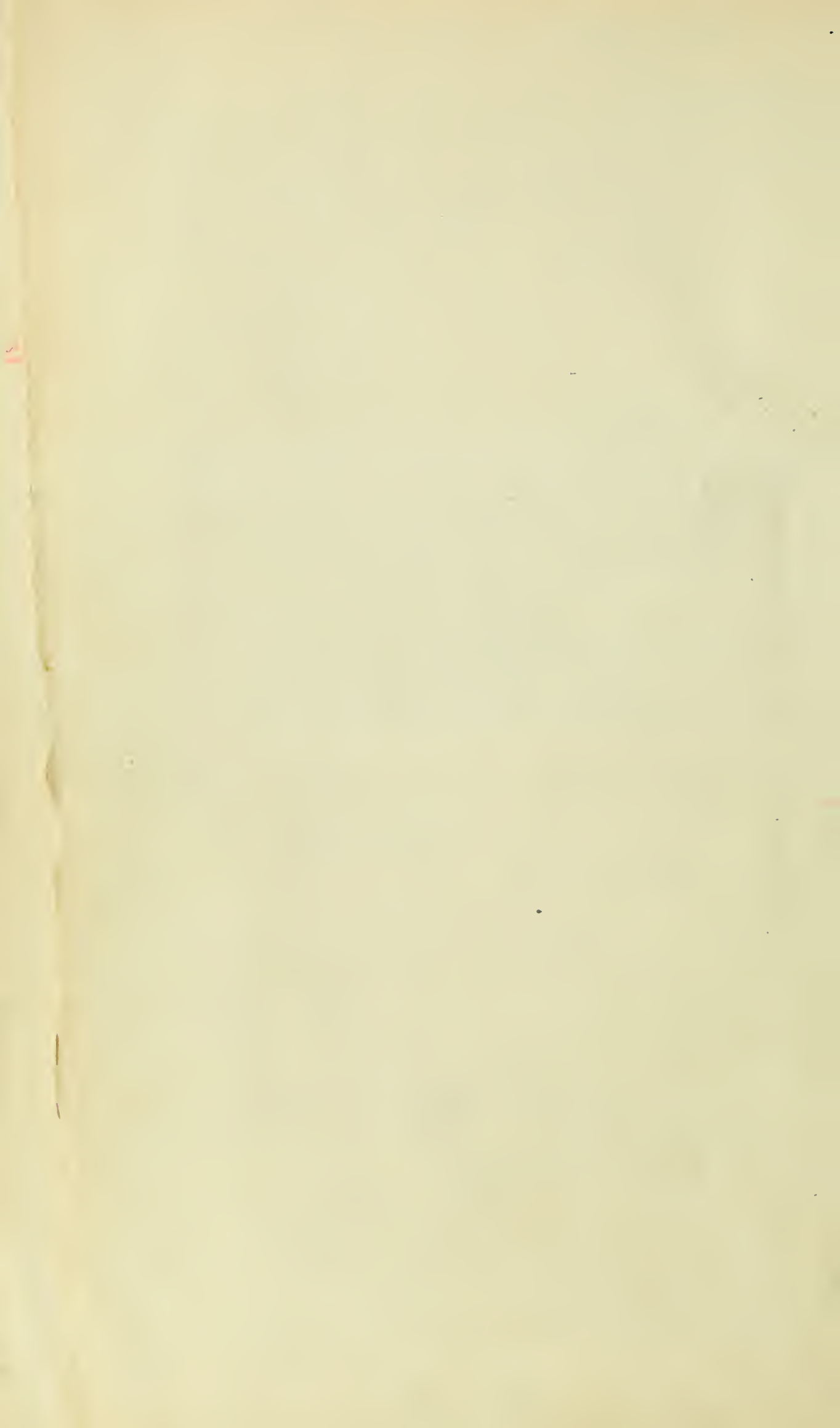
Whether this national heritage of the unique, the beautiful, and the marvelous, somewhat aided by art and judicious management, is to thus become and ever remain the chosen resort of the student, the scientist, and the weary and worn pilgrims for health and pleasure of our own and other lands, or be given up, as heretofore, to the ruthless vandalism of all comers, depends upon the tendering or withholding of the fostering hand of the guardians of our nation's wealth and weal without delay.

P. W. NORRIS,

Superintendent of the Yellowstone National Park.

Hon. CARL SCHURZ,

Secretary of the Interior, Washington, D. C.



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R E P O R T
Upon the
YELLOWSTONE NATIONAL PARK,
To the
Secretary of the Interior,
By
P.W.Norris,
Superintendent.
For the year, 1878.

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REPORT

ON THE

YELLOWSTONE NATIONAL PARK.

NORRIS, MICH., *December 10, 1878.*

SIR : I have the honor to submit the following report of my operations in the field during the season of 1878 :

As soon as the appropriation for the Yellowstone National Park became available, I proceeded via Omaha and Ogden direct to Bozeman, Mont.

From Detroit, Mich., Mr. B. F. Bush, an early and enthusiastic member of the scientific association of that city, accompanied me as assistant at a mere nominal salary, purposing to remain in the park during the winter to keep a regular weather record, and explore and sketch its main wonders, at present but little known at that season of the year. In public meetings at both Virginia City and Bozeman I fully explained the boundaries, wonders, and necessities of the park ; your rules and regulations and my plans for its protection and improvement ; and was by the speakers, the resolutions, and press reports thereof sustained by unanimous pledges of earnest sympathy and support.

At Bozeman I rapidly outfitted for the park and reached it, 70 miles distant, in time to take observations of the *there* total eclipse of the sun, July 29, from a lofty, unexplored basaltic pinnacle of Sepulcher Mountain, as did Messrs. Bush and Bottler from the Cinnabar.

As stated in my preliminary report, the increasing probability that the hostile Bannocks would, like the Nez Percés of last year, raid the park from the west, induced me to defer the purposed erection of buildings at the Mammoth Hot Springs and seek to construct a road thence, connecting the entrance from Fort Ellis with that from Henry's Lake to the Lower Firehole Basin, for military as well as other purposes. A prudent regard for the safety of our limited appropriation also induced me to send back our official and other valuables to Bottlers', and to purchase but few animals, mainly hiring them with their owners at only trifling additional expense and no risk of loss.

I thus quickly organized a party of some 20 well armed, mounted, and equipped, resolute and reliable mountaineer laborers, and, with only one baggage-wagon, rapidly constructed a road three miles up the lofty Mammoth Hot Springs terraces, and through an excellent pass to the West Gardiner Valley.

From the summit of Sepulcher Mountain I had upon the day of the eclipse, with a field-glass, traced my route of 1875, along connecting ridges of the Gardiner and the Gibbon, through a cañon nearly parallel with the Snowy Madison range. More easterly and nearly due north from my point of observation stretched the long, open, grassy valley of an unexplored branch of the Gardiner issuing from a deep cañon and the towering cliffs of the Grand Cañon of the Gibbon, and far

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away over and beyond the Firehole Basins and continental divide, the serried glistening crest of the Three Tetons high above the clouds.

Subsequent careful and long continued explorations of this route proved it, although difficult and dangerous of construction through several cañons and firehole basins, the most direct and practical one for a wagon road across the park.

As Barronette's party had left and Professor Hayden's not reached the park, we were doubtless for a time the only white men within or near it, requiring constant caution in scouting and labor, as well as in care of animals and making and guarding camp. Despite these annoyances, we crossed the terraces, rapidly bridged the first branch of the Gardiner, forded the next two branches, and ascended the last through a two-mile cañon, and, with nearly a half mile of bridge and causeway, crossed the foot of Beaver Lake.

Obsidian there rises like basalt in vertical columns many hundreds of feet high, and countless huge masses had fallen from this utterly impassable mountain into the hissing hot-spring margin of an equally impassable lake, without either Indian or game trail over the glistening fragments of nature's glass, sure to severely lacerate. As this glass barricade sloped from some 200 or 300 feet high against the cliff at an angle of some 45° to the lake, we—with the slivered fragments of timber thrown from the heights—with huge fires, heated and expanded, and then, men well screened by blankets held by others, by dashing cold water, suddenly cooled and fractured the large masses. Then with huge levers, steel bars, sledge, pick, and shovels, and severe laceration of at least the hands and faces of every member of the party, we rolled, slid, crushed, and shoveled one-fourth of a mile of good wagon-road midway along the slope; it being, so far as I am aware, the only road of native glass upon the continent.

Then, by a full mile of grade, we flanked Beaver Lake, skirted a dashing rivulet of green alum-water, through a fine pass, and beside a lone lake in a forest of dense pines to the lovely valley of an unknown fork of the Gibbon, descended this to, and three miles through, an unexplored but extremely active and interesting firehole region, and skirting another, near the second falls and cañon to the wild-flax and clover-covered park-bed of an ancient lake, to the head of the Grand Cañon of the Gibbon.

Thence, without the guide of even a game-trail, by immense labor, and twice crossing the stream, we for some four miles traversed its cañon, nearly a half mile deep. We then emerged through an ancient channel, and skirted the very brink of a precipice nearly a thousand feet above the 80-foot falls and foaming rapids, and six miles of open pine-clad terraces to Howard's road from Henry's Lake, an estimated distance of 45 miles from the Mammoth Hot Springs, mainly through a region heretofore totally unexplored; then 15 miles farther through the Lower Firehole and midway to the upper geysers, our wagon being the first to make a track along the Upper Firehole River.

We joyfully met the Gannett and Holmes party of Professor Hayden's geological surveying expedition at the lower geysers—the professor himself at the upper, and between them the various members of his Wilson party straggling in afoot and exhausted after loss of their animals and other outfit by the Indians near Henry's Lake.

It was truly a pleasant and fortunate meeting for all parties, after more than a month of hazardous mountain climbing and isolation from the outside world and each other; and amid abundant evidence of surrounding Indians, we for days pressed our various duties within supporting distance of each other.

A courier from General Brisbin warning me that the hostile Bannocks were pressing through Tyghee's pass, and advising concentration for defense, until relieved by himself or General Miles, delayed us, still laboring upon the roads, at the forks of the Fireholes, until getting short of provisions, when we retraced our route to the Mammoth Springs. Here finding General Brisbin with a Gatling battery and all the troops available, and that the main band of hostiles had meanwhile crossed our road between us. I there also found that the Bozeman Bank containing my government deposit was closed, requiring the assistance of my bottler friends to continue the work.

Although the funds were ultimately replaced in Helena without loss to myself or the government, and General Miles met and in a sharp conflict nearly exterminated the Bannocks, yet these circumstances wholly unavoidable and not likely to again occur, were, in the midst of a short season's operations, peculiarly annoying and retarding.

During a tour of the park with General Miles, and in reviewing the old trail-routes and exploring new ones, I was enabled to keep a small party actively engaged in improving my road to the geysers, that towards Fort Ellis, and a new one to the forks of the Gardiner on the route to the falls and lake, and several additional bridle-paths and bridges.

Also, in view of the remote, if not immediate, possibility that the scaling off of heavy masses of rock from the famous extinct geyser-cone called Liberty Cap might destroy its equilibrium, causing its fall and lamentable destruction, I erected rough but firm braces of timber under the shoulder of the endangered side.

After the commencement of autumn storms rendered the employment of a large party of laborers unprofitable, I, with one or two reliable scouts, continued the exploration of mountain passes and routes for roads and bridle-paths, learning much of exceeding value in future operations. Lastly, through October snow-storms, explored the crags and cañons along the head of the West Gallatin in the northwestern corner of Wyoming, to learn if its boundaries may there be adopted as those of the park, as is for many reasons desirable.

Having thus fortunately closed the very arduous field duties of the season, and, without the loss of a man or an animal, safely left the government property at Bottlers', I crossed the range to Bozeman. Leaving here October 14, I, without special incident or delay, returned via coach, Utah Northern and Union Pacific Railroads.

My assistant, Mr. Bush, kept a regular record of weather observations, and other notes of interest, and greatly assisted in obtaining a large and interesting collection of fossil wood, chalcedony, obsidian, &c. But unfortunately the unexpected hardships of our camp-life and season's duties impaired his health as to compel his return down the Yellowstone, but late as to endanger being frozen in; and, leaving the Mackinaw at Fort Lough, he took a mule-train to Bismarck and has but recently returned.

EXPLORATIONS.

While my explorations of the route connecting the wagon-road entrances to the park, and that between the Grand Cañon and Mount Ashburn are doubtless the most important of the season, still I deem any others of considerable interest and value.

Beaver Lake, at least a half mile wide, of considerable depth, and in summer alive with geese, swans, and other water-fowl, is mainly if not wholly artificial. It is evidently formed by a succession of beaver-dams wandering in nearly every graceful curve, each with a fall of from 2 to

6 or 8 feet, probably aggregating some 30 or 40 in less than 2 miles; with a bare flat, like an estuary of the sea, where the dark green alum-water of a hissing firehole basin enters it.

An impure obsidian, black, with white flecks and cavities, is common in the park, notably at the Great Falls; but chips, flakes, arrowheads, and other Indian tools and weapons have been found by all recent tourists and explorers, in burial cairns, and also scattered broadcast in all those mountain valleys, of a different and much superior kind of obsidian, and from a source unknown until my discovery of it this season. I had seen the cañon from Sepulcher Mountain some 20 miles distant, and specimens of obsidian increasing in number, size, and beauty as I neared it, only in wonder and admiration there to find the eastern palisade—for two miles in distance and many hundred feet in height, literally towering vertical pillars of glistening black, yellow, and mottled or banded obsidian basaltic columns in form, but volcanic glass in fact—ever for the aborigines a vast weapon and implement quarry, of obsidian of a quality unequalled, and a quantity elsewhere unknown. \angle

The pine and crystal-spring bordered, wild-flax and clover-clad glades of the Norris Fork of the Gibbon, in beauty and value for the tourist are unsurpassed by any in the park; and the open grassy park, 5 or 6 miles in circumference, between the upper and lower falls and cañons of the Gibbon, dotted and begirt by huge boiling springs, sputtering paint-pots, and spouting geysers, many of them timber-hidden, high up the encircling mountains, for beauty and for grazing I deem invaluable.

Upon the crest of the western mountain spur, rising nearly vertical full 1,000 feet above the head of the Grand Cañon of the Gibbon, is a firehole basin, containing, probably, less than 5 acres, yet one of the most beautiful and interesting within the park. There, mingled with hot springs and spouting geysers, are 12 pulsating geyser cones from 2 to 20 or 30 feet in height, in form and character similar to the famous Liberty Geyser; and, like that, fully one-half of them are extinct and slowly eroding away. Others are still active; one of them a tall fumerole, pulsating like the exhaust-pipe from a huge Corliss engine, and another has the orifice and terminal of its cone positively horizontal, instead of vertical. Although there are still at least one powerful geyser and a hissing fumerole plainly audible for miles, yet there is abundant evidence that this basin is in all respects but a dwindled remnant of what it was at no remote period, when its matchless geyser supplied four separate and distinct torrents of hot water in hissing cascades adown the mountain crags. As discoverer, and probably yet sole white visitor, I from its group of white geyser cones name it the Monument Basin, and I trust none will ever question the appropriateness of Beaver Lake, Obsidian Mountain, and other names given to localities which I have discovered and explored.

Along and near the upper cañon of the Gibbon, are pulsating geyser cones of both yellow and crimson, paint-springs, and rivulets of nearly every color, geysers throwing their jets some at least 100 feet at an angle of 40° to 60° , instead of vertically as in the old basins; and in the open basin along the road, beside many small but beautiful geysers, is a large crater formed so recently that many pine trees within and around it still retain their seared and mud-laden leaves.

Mount Washburn is alike the great landmark, observatory, and unavoidable obstacle upon the route from the forks of the Yellowstone to its falls and lake; and a route less elevated, bleak, and snowy than the now used over the western spur, is exceedingly desirable. Fully aware of this, I have for years sought for record of tourist or explorer, or legend of mountaineer, claiming to have ever passed between Mount

Washburn and the Grand Cañon, but utterly failed, and my injury at Tower Falls checked my personal efforts of last year. Nor did I find an opportunity this season until September 26, when with Adam Miller and R. B. Rowland, the two most experienced mountaineers of those regions, and five good horses, I started to explore it. From the falls of Tower Creek I explored its cañon and the cañon and valley of Antelope Creek above it, the timbered plateau between them, and also that between the latter and the Grand Cañon. I found the latter very elevated, but open, smooth, and grassy, with a fine lake upon its summit, mainly an excellent route, with magnificent scenery along the yawning, sulphuretted and stained cañon, for some 6 or 8 miles, and past the ruins of an ancient, once loopholed, earth-roofed block-house some 16 by 20 feet in diameter and of unknown origin, to a dense forest at the foot of a bald rocky spur of Mount Washburn.

Its tangled timber border, rocky sides, and sharp, serrated crest, as seen from Mount Washburn above and the valley below, and its estimated fully 2,000 feet of vertical faces where cut by the Grand Cañon as seen across it, with others similar nearer the falls, had ever been deemed impassable.

A careful exploration of the first one from its towering front in nearly a foot of newly fallen snow, through a belt of dense pine, fir, and cedars so near the main mountain, resulted in there finding a pass excellent for a bridle-path, and practicable for a wagon-road, at a much lower altitude than the old route.

From a rocky, snow-girt peak in this pass I saw others still better in the remaining timber-fringed mountain spurs, and became well assured of success. I camped in a dense clump of pines and balsams in a sheltered grassy glade amid the snow, and like Fremont on an island in the Great Salt Lake, or Stevenson and Elliot upon one in the Yellowstone beyond the reach or fear of Indians, enjoyed the sweet repose of the weary, successful and contented.

With increasing premonitions of a gathering mountain storm, my plans were formed and camp in motion with the early dawn. Hastily recording our visit upon one of the trees of our canopy, I sent my men with the animals to seek a route through the remaining spurs and timber to the cascade and Great Falls, instructing them to await there a day before arching for me, should I fail to arrive. Then with rifle and hatchet, foot, and alone, I descended a side cañon through all its labyrinth of windings, tangled timber, and crumbling walls, to the pent-up, roaring Yellowstone in the nearly hidden recesses of the Grand Cañon. Nearly blinding me was the mouth of a yawning side cañon soon hidden in its windings, somewhat above a side cascade nearly lost in spray in its fully 1000 feet descent, and about and above me the stifling sulphur fumes of hissing fireholes, alike a serious obstacle to my purposed exploration of the cañon to the falls, and a warning to leave it without delay. Through great exertion, I breathless and exhausted reached the timbered plateau, and through fast-descending, large, downy snow-flakes ascended to the Great Falls, the thunders of which for miles came in rumbling echoes in the fearful depths. I there, in the gathering twilight, thankfully enjoyed the greeting shout and blazing camp-fire of my men, just safely arrived with the welcome intelligence that they had found a route in all respects preferable to that over the mountain to Cascade Creek.

The day had been without wind, and for a snowy one remarkably so, and the snow, which was more than a foot deep before night, really benefited, plainly disclosing the various hot springs and sulphur basins, as

well as the clear-cut edge of the Grand and side cañons, and brink of the large yawning land-slides.

As the Grand Cañon is doubtless mainly one of erosion, like that of the Niagara, with a stream much smaller and gorge several times as deep, the hot springs have, by undermining the shelly walls, caused several of these slides of incredible dimensions. One of them extends at least a mile back from the river, a fourth of a mile along it, and fully as deep, with a grove of timber still flourishing upon the portion not yet removed by the river, which, as well as a roaring rapid, and, I think, a fall or cascade, are hidden by it. Two or three other smaller but similar ones, with their short, cañoned rivulets, by deeply indenting and lengthening the edge of the cañon, are the main obstacles to a road along its plateau brink. For though the pine, spruce, and fir timber is mainly very dense, yet it is small, only averaging a proper size for railroad cross-ties, easily removed from a road-track, and useful for its small bridges; and as I did not for many miles see a trail, hatchet-hack, or other trace of a human being, I have no doubt of my being the first explorer of the entire brink of the Grand Cañon of the Yellowstone, itself still mainly untrodden.

As before stated, portions of any possible route upon either side of the Grand Cañon between the forks and the falls of the Yellowstone will be elevated and expensive, especially for a wagon-road. That upon the eastern side of the cañon is utterly impracticable; that within it, unknown, but doubtless mainly so, while of the two remaining, that I explored is the shortest, least elevated, and easiest of construction, in fact, in all respects so preferable that I have no question of its adoption for all purposes other than a lofty, bridle-path lookout, for which purpose a portion of the old route, a branch from the new one over Mount Washburn, or both, will ever be desirable. Not only was the route thus found less rugged and difficult than feared, but also the Grand Cañon was shorter, and especially its lower portion less deep and yawning than has been considered. Still it is, especially from its yellow and crimson geysers to the falls, beautiful and grand beyond conception, a leading wonder of the park and of the world, every way worthy of a route along or as near as possible to its misty and sulphur-tinted walls.

From the falls I ascended the Yellowstone to its lake, but was prevented by deep snows and by Indians from a projected trip around it. Leaving it at Steamboat Point, I traced a trail route, via Pelican Creek and Amethyst Mountain, to the forks of the Yellowstone, a new route across the main river, and thence through the cañon of the East Gardiner to the Mammoth Springs.

During these various explorations of routes for roads and bridle-paths, various paint pools, fossil forests, and other places of interest were discovered. But as most of them were subsequently visited by some members of Professor Hayden's geological survey, in connection with their own numerous and valuable discoveries and explorations, I leave further description in more appropriate hands.

SUMMARY.

So well are its attractions understood, and so popular is the park in all those regions, that I have been cordially sustained by the civil and military officers, and the leading citizens, in my efforts for its protection and improvement. Still, to properly restrain the lawless citizen or tourist from wanton slaughter of animals, and other acts of vandalism, I deem additional legislation of various kinds indispensable.

That the special rules and regulations, necessarily anomalous and conflicting with the roving-hunter habits of the surrounding mountaineers, cannot be effectively enforced without the limits of their operations (the boundaries of the park) being established and plainly marked, is too evident for controversy. Equally so is the necessity for a thorough knowledge by all parties as to what civil and military officers of those regions are empowered and obligated to assist the superintendent in the prompt enforcement of these rules and regulations in every portion of the park. Nor should leases for any purpose be granted, or permanent occupancy or improvement by any parties be allowed, except in conformity with these necessary rules and regulations, quietly, affably, but uniformly enforced.

Complications arising with several parties claiming to have made improvements within the park prior to its dedication as such, render their adjustment so desirable that I urge their consideration at the earliest practicable moment. As at least the mining portions of these complications are probably without the boundaries of Wyoming Territory, which, as this season's exploration clearly proves, embraces all the wonders desired within the park, I earnestly recommend changing its northern and western boundaries to conform to those of Wyoming and the speedy completion of their survey. This is for many obvious reasons very desirable, among which is, that running *one* east and west line will fix the borders of the Territories of Montana and Wyoming, and also those of the park and the Crow Indian reservation, thus alike avoiding present expense and future complications from the exceedingly diverse judicial and other modes of managing contiguous regions.

As the park adjoins the settled portions of Montana, while wholly isolated from those of Wyoming, I suggest the propriety of its being at least temporarily attached to Montana for judicial purposes.

The few Sheepeaters, Bannocks, or Shoshones who alone once resided within the park, now belong at their agencies with other annuity Indians. Hence, no Indians now visit the park save as a haunt for purposes of plunder, or of concealment after bloody raids upon the ranchmen, pilgrims, or tourists. Therefore, I urge the necessity of the agency Indians of all the surrounding tribes being officially notified that they can only visit the park at the peril of a conflict with each other and the civil and military officers of the government; and a rigid accountability for plunder of all kinds taken into any of these agencies. This, with a small military post, or at least a summer camp, at the Yellowstone or Henry's Lake, or the Forks of the Fireholes between them, would prove alike valuable in protection of the park and the adjacent valleys; and being warmly recommended by both the civil and military officers of those regions will, it is hoped, secure it and the future safety of the park, and its routes of access. These are rapidly approaching by railroad, steamboat, and coach route up the Yellowstone via the gate of the mountains at Bozeman to the Mammoth Hot Springs, and also by the Utah Northern Railroad, now completed from Ogden to near the Snake River, with their promise of reaching Market Lake and a coach route of some 150 miles via Henry's Fork and Lake, to the Forks of the Firehole within the park. Such prospective coach connection with the park renders more urgent the necessity of at least a wagon-road through it, not only along the direct route which I explored and roughly opened this season, but also the much longer, rougher, and more costly route unavoidable along the old trail, to view the great Yellowstone Lake, Falls, and Cañon, and for the completion of the circuit of the park, and view of its greatest wonders.

This season's explorations and careful observations of the bison, elk, bighorn, and other animals within the park, and also of those originally taken from there and now roaming peacefully with our domestic animals in the Bottler Park, the expressed views of their owners and also other mountaineers the best acquainted with the haunts and habits of those still wild—information every way practical and valuable—fully justify my last year's recommendations for their protection and domestication.

I thus still adhere to the views then expressed, that the delta-shaped portion of the park bounded on the west by the Yellowstone Lake, River, and Cañon, the Snowy Range upon the east, and north by the deep-sheltered grassy East Fork Valley, where the most of these animals now are, and where the residue would soon concentrate if there especially protected, is the place, and now is the time, to preserve living specimens of the dwindling remnants of our most beautiful, interesting, and valuable native animals and birds. Hence I again urge the necessity of making leases to responsible parties (some of whom are now ready if protected from Indians) as sub-agents of the government to protect and gradually domesticate a portion of these elsewhere nearly extinct animals, with no other cost to the nation than the exclusive right within certain prescribed districts of raising hardy vegetables and domestic animals for themselves, which are also necessary for the use of future tourists in the wonder-land.

There is an abundance of excellent grass, wood, and water at the Mammoth Hot Springs; and of the several excellent building-sites the accessible oblong grassy butte, commanding a view of the matchless terraces, the cañon of the main Gardiner River and its branches, should doubtless be selected for the headquarters of the superintendent of the park, or for a much needed commodious hotel, baths, and other out-buildings. There are several good building-sites, plenty of wood, fair water, and excellent water easily obtainable near the castle and Old Faithful, but a scarcity of pasturage in the upper basin. Building-sites, water, and pasturage are very inferior at the lower geysers; but upon a terrace of the lofty lookout butte, just above the forks of the Firehole Rivers is a site easily approachable from, and commanding a fine view of, the open valleys of both the forks, and the Madison River below their junction, with their boundless pasturage, countless geysers, and other hot springs, including the Lower Geyser Basin some two miles south and directly fronting it. Wood and water are here abundant, the former excellent, the latter very inferior; nor can this only drawback upon an otherwise peculiarly favorable strategic location be remedied except by conveyance of water in pump-logs or otherwise from a distance of several miles. There are several charming sites for a hotel and yacht or steamboat landing near the foot of Yellowstone Lake, and a lofty site with nearly every natural convenience and few disadvantages, commanding a full view of nearly all the concentrations of wonders at the Great Falls.

There are several excellent sites, and necessity for occupancy of at least one of them, among the geysers which I explored this season: a matchless one for grazing and for domestication of the bison, elk, and other wild animals, near the famous Soda Butte; also a route for approach and crossing of the main Yellowstone near the forks, far preferable to that of the Barronette Bridge, now so decayed and burned as to be very dangerous; or to the abutments of the miners' bridge commencing above it.

At any or all of these localities the bison can be at least as easily and reliably reared as domestic cattle, with its flesh fully equal and its meat

black curly robes far more valuable than those of the buffalo of the plains, and with the excellent and abundant timber material, inclosures can be cheaply made for preservation of a few specimens of the elk, antelope, and other animals of great interest to future tourists.

With another season's improvement and construction of roads and bridle-paths, the promised routes of access, and protection from Indians, I have all confidence of being able to effect leases to responsible parties for the construction of much-needed hotels, and also for a yacht or small steamer upon the mystic Yellowstone Lake.

A plain but comfortable residence with the necessary outbuildings for the use of the superintendent of the park and the safety of the papers and other national property at one of the main entrances to the park, is so obviously necessary, that their construction has only been deferred because of the Indian raids now hopefully terminated.

With this view I am having lumber and other material prepared for construction of these buildings early next season, mainly with the unexpended balance of the appropriation for the present fiscal year.

HISTORY OF THE PARK.

Believing that, aside from purely scientific questions already in more appropriate hands, a brief statement of the location, dedication, and leading features of the Yellowstone National Park, and a reference to its prominent explorers and route of access, will prove of present and permanent interest and value, I devote a few pages of this report for these purposes.

As it will require months to compile Professor Hayden's extensive explorations and surveys of the past season and to issue a doubtless correct and valuable map of the park, I insert a small and tolerably accurate one for present use. There can be no doubt that the modern sulphur basins, mud-salses, hissing fumeroles, and spouting geysers are only twindling remnants of the ancient volcanoes and vast and long-continued eruptions of lava, which in the region of the National Park characterized the elevation of the great plains and Rocky Mountain ranges from the oozy bed of a shallow ancient sea.

It is also evident that at some subsequent, but remote, period of time many of these mountain slopes at an elevation of from 6,000 to 10,000 feet were covered with dense forests of timber, in size fairly rivaling those now upon the Pacific coast; and that by some eruption, perhaps like that which covered Pompeii and Herculaneum, these forests were suddenly crushed or covered and encased by a sea of hot ashes, mud, and slime.

Here erosion of the elements, or the fuse, pick and shovel of the tourist nearths this ancient timber, often petrified entire, a perfect tree or log of stone; others timber in form, opal or chalcedony in fact, with amethyst or other crystallized cavities, matchless in form, color, and beauty, and for cabinet specimens, elsewhere unequalled in nature and unrivaled by art.

Many hot springs and mineral streams now petrify timber, or coat it with sparkling lime or silica, build geyser cones, and many beautiful rims of crystallization, but all clearly distinct, and mainly much inferior to those of the closing eruptive period.

As can be seen upon any map of the United States, the Snake River Fork of the Columbia, and Green River Fork of the Colorado of the Gulf of California (Pacific waters), as nearly all the other great rivers of that portion of the continent, including the Jefferson, Madison, and Gallatin

Forks, and the Yellowstone, Big Horn, and other branches of the Missouri-Mississippi-Atlantic waters, and the longest river upon our globe, radiate (often) from hot springs or spouting geysers within or adjacent to the great National Park, situate mainly in Northwestern Wyoming Territory. This is really less one large park than a group of smaller ones, partially or wholly isolated, upon both sides of the continental divide, here much lower than the nearly unbroken surrounding mountain ranges. Its average altitude probably exceeds that of Yellowstone Lake (some 8,000 feet), or nearly a half mile higher than Mount Washington: its few and yawning, ever difficult, often impassable, cañon-approaches along foaming torrents, and the superstitious awe of the hissing springs, sulphur basins, and spouting geysers, and unfrequent visits of the surrounding pagan Indians combined to peculiarly delay the exploration of this truly mystic land.

Although Lewis and Clarke, by ascending the Jefferson instead of the Madison or Gallatin Forks of the Missouri in 1805, crossed the Rocky Mountain Divide some 50 miles west of the park without its discovery, yet it is from a member of that first band of Northwestern explorers that we derive our first knowledge of its existence. Coulter and Potts, after their discharge in 1806, retraced Captain Clarke's return route, via the Yellowstone River and Bozeman Pass, to the three forks of the Missouri. They there continued to trap and hunt until Potts was killed and Coulter captured in a Blackfeet Indian ambushade below the famous Beaverhead landmark upon the Jefferson. Coulter was allowed to run the gauntlet for his life, and, being remarkably fleet of foot, distanced all but one of his pursuers, whom he pinned to the earth with his own war-lance, and escaped, over 6 miles of prickly-pear plain, to some drift-wood at the head of an island in the Jefferson. Unarmed, naked, and lacerated, he, through untold dangers, hardships, and suffering, reached a trading-post on the Lower Yellowstone, rearmed and returned to his Bannock friends, and for years hunted, trapped, and with relentless vengeance fought the Blackfeet.

The haunt of the main Bannock tribe was at Henry's Lake, west of the park, that of their little Sheepeater Band within, and their main buffalo range upon the Big Horn, east of it, and Coulter certainly visited the Great Falls, Yellowstone Lake, and some of the firehole basins and spouting geysers, and ever after his return to Missouri in 1810 gloried in describing them. Yet so little credence was given his descriptions, that for many years, even long after I was first upon the Lower Yellowstone, "Coulter's Hell" was a standing camp-fire jest upon now well-known realities, and John Coulter is, without a shade of doubt, the first white explorer of any portion of the Yellowstone National Park.

In 1809, the veteran fur-trader Henry, driven from the three forks of the Missouri by the ferocious Blackfeet, constructed and for a time occupied a stockade fort upon the outlet of the lake, which still bears his name.

W. P. Hunt and Ramsey Crooks, in their outward route to the ever ill-fated Astoria, with a strong party in 1810, and also the feeble remnant of the band during their return in 1812, crossed the Wind River Range south of the park.

The famous American mountaineers Henry, Ashley, Sublette, and Jackson, the Scottish Campbells and Stewarts, the French Pierre, Poirer, Neuf, and Fontenelle, and other renowned trappers and traders, roamed over the regions surrounding the park until the most of them were killed by the Indians, down to the expedition of Captain Bonneville, in 1822. During that year a sanguinary battle was fought between the ever-bloody

Blackfeet and the combined bands of these fur-traders and their Bannock friends at their general rendezvous in the famous "Pierre's Hole," near the Three Tetons, within plain view of mountains within the park; and yet, most strangely, in all the published reports of these famous mountaineers, we fail to find a hint of the park or its wonders.

During nearly three years of trapping and trading with the Indians by Captain Bonneville and his detached parties, in all directions from the park, it is evident that he neither visited it nor learned its true location. For although his map of those regions was far more accurate than *any* before and *many* after it, even that shows the largest mountain lake as the head of the Snake River instead of the Yellowstone; hence Pacific instead of Atlantic waters, inaccurate in form, without a name, and no indications of the great falls, canons, or geysers, or any of the firehole basins. In fact, in his only reference to the latter (Irving's Bonneville, page 236) he erroneously locates it upon the Stinking River (now Water) branch of the Big Horn, where the sulphur fumes from an extinct geyser basin somewhat resemble those of the park, but every way less mountaineer-girt and important than those which Coulter saw within the park.

I have ever given much credence to a well-endorsed camp-fire legend of a mountaineer named Smith having, prior to the days of Bonneville, written a narrative of his explorations of the firehole regions, and being killed by the Indians before its publication; but have never found written proof thereof. Border legends, although often gross exaggerations, are seldom wholly false, and scores of them indicate that white mountaineers did long ago occasionally visit portions of the park for trapping or concealment, and perhaps both. This is, in fact, proven by ancient stumps of large trees cut for breastworks and for foot-logs across the crevice, Hellroaring and other mountain torrents, which no experienced mountaineer would fail to recognize as those of white men, from being rounded from below in a way never practiced by any known Indians. Also a corral near Amethyst Mountain, and the ruins of an ancient block-house with earth roof and port-holes, clearly the work of unknown white men, near the grand cañon below Mount Washburn, and a cache of marine steel-traps of a peculiar form only used by the Hudson Bay trappers some fifty years ago, which were recently found along our road near the Indian arrowhead quarry at Beaver Lake.

In Captain (now General) Frémont's reports of his explorations in those regions in 1842-'44, he describes mountain scenery and harmless hermit Indians similar to those in the park, but no geysers; being probably ignorant of their existence.

In 1844 James Bridger told me personally, and as I now know correctly, described the cañons of the Upper Snake River, but had then neither seen nor obtained a correct conception of the geysers, deeming them real volcanoes. His description of the Two Ocean Pass south of the park is now admitted to be mainly correct, and there is more of truth than sport (as per camp-fire custom) in his famous story of a foaming torrent, icy cold at its snowy fountain-head, and seething hot half a mile down the mountain-side, though not caused, as he boasted and perhaps believed, by the velocity of the descent, but by a crag-hidden firehole basin of boiling water and seething brimstone.

So with his famous legend of a lake with millions of beaver nearly impossible to kill because of their superior 'centness, with haunts and houses in inaccessible grottoes in the base of a glistening mountain of glass, which every mountaineer of our party at once recognized as an exaggeration of the artificial lake and obsidian mountain which I this year discovered, as briefly stated in my explorations-chapter of this re-

port. But as its location, as also that of the arrow and lance head quarry, is across a sharp mountain range from where represented, and so long sought by trappers, it is not probable that he ever saw them, but that his information was derived from old Hudson Bay trappers or their Indian allies, alike interested in deceiving him as to their true location. These rumors of a mountain-girt land of wonders at the fountain-heads of the Missouri and Yellowstone so impressed Lieutenant (now General) G. K. Warren during his explorations of the Black Hills and great plains up to 1857, that he planned an expedition to explore it. This strong, well-equipped party, under the command of Captain (since General) W. F. Reynolds, with Prof. F. V. Hayden as geologist and James Bridger as guide, spent the season of 1859 in exploring the Black Hills and Big Horn regions, and failing to cross the towering Yellowstone Range and reach its mystic lake, wintered upon the North Platte. He renewed his efforts in the spring by sending Lieutenant Maynadier with a party down the Big Horn to again seek a pass from the east, and with the main party himself sought one up Wind River from the south. Both parties failed; Reynolds by encountering a buttressed-based, snow-capped mountain wall, to cross which Bridger declared that even a crow would need to carry his grub, or provisions.

Turning to the west and crossing the main Wind River divide, near the head of Green River, and failing in another effort to reach the cliff and snow encircled park from near the Three Tétens, he abandoned the effort, and followed the old traders' route via Henry's Fork and Lake to the Three Forks of the Missouri. He was there joined by Lieutenant Maynadier, who, failing in all his efforts to reach the park from the east, had crossed the Yellowstone in buffalo-hide boats below the gate of the mountains, and through the Bozeman Pass had reached and descended the Gallatin.—(See Ex. Doc. 77, Fortieth Congress, first session.)

The utter failure of a two years' search for the geyser basins by such well-equipped parties and led by the most famous guide of the mountains, proves them mountain-girt, isolated from the surrounding regions, with few and difficult known routes of access.

Thus baffled, the government made no further effort to explore the park until long after gold-seeking pilgrims had visited various portions of it. Prominent among these prospectors were Bart Henderson, Adam Miller, George Houston, and C. J. Barronette around the Forks of the Yellowstone, and Frederick Bottler and H. Sprague from Henry's Lake to the forks of the Firehole River. All these were prior to 1869, when two hunters, named Cook and Folsom, visited portions of the park, but their verbal report, made to General Washburn and others who sent them from Helena, has never been published.

Having myself, long before the Reynolds expedition, failed, as he did, to reach the park from the east, I, after many years' absence from those regions, sought, in June, 1870, to reach it by ascending the Yellowstone above the gate of the mountains, accompanied by Frederick Bottler. Deep snows baffled our resolute efforts to cross the Madison Range to the geysers, and, when seeking to descend to the Yellowstone Valley below the Mammoth Hot Springs, Bottler was swept away in attempting to cross a mountain torrent above Cinnabar Mountain, losing his rifle, ammunition, most of his clothing, and nearly his life. This mishap compelled our most reluctant return from within the park through the then nearly unknown and impassable second cañon of the Yellowstone to Bottlers', then the only white ranchmen upon any portion of the mighty Yellowstone River. Thence I retraced my route to Fort Ellis and published a brief account of my trip (see No. 3 of my Journal of Ran-

es in the Far West), and, under previous engagements, descended the Columbia to the ocean, purposing to return with a party to explore the park the next year.

During the following autumn the Washburn expedition was suddenly organized for exploration of the park. It was composed of H. D. Washburn, N. P. Langford, T. C. Everts, S. T. Houser, C. Hedges, W. Truham, B. Stickney, W. C. Gillett, and J. Smith.

General Washburn, in command, was then surveyor-general, at least C. Everts and N. P. Langford ex-officers, and all prominent and esteemed citizens of Montana Territory, well equipped; and, at Fort Ellis, joined by Lieut. G. C. Doane and seven men, they followed my return route to and up the Yellowstone through its second cañon. They missed the Mammoth Hot Springs, but visited Mount Washburn, the Great Falls and Lake, returning by the Firehole River and Madison route to Virginia City. When among the fingers of the Yellowstone Lake, Everts lost his way, horse, arms, and provisions, and after thirty-seven days of exposure, starvation, and suffering, doubtless unequalled by any other man now living, was found by Barronette and Prichette, barely alive, upon the Black Tail near the Mammoth Hot Springs. This is the first party of really successful explorers of any considerable portion of the park of which we have any public record. (See General Washburn's surveyor-general's report; also that of N. P. Langford, in the May and June, and T. C. Everts's *Thirty-seven Days of Peril* in the November number of the second volume of *Scribner's Monthly Magazine*, and Lieutenant Doane's report, Senate Ex. Doc. 51, Forty-first Congress, third session.)

The interesting letters, reports, and personal influence of the various members of this party led to Professor Hayden's interesting and valuable explorations in the wonderland in 1871. (See Professor Hayden's *Geological Surveys of 1871*.) Capt. J. W. Barlow and D. P. Heap also made valuable explorations, maps, and report of portions of the park in 1871. (See Senate Ex. Doc. 66, Forty-second Congress, second session.) During the succeeding winter Professor Hayden was with his associates very active in publishing and distributing photograph views, etches, and other valuable information in reference to the matchless wonderland, and in preparing, and, aided by many leading members of Congress, advocating to its passage a bill dedicating it as a health and pleasure resort for the American people under the name of the Yellowstone National Park. For its boundaries and control by the Secretary of the Interior, see hereinafter copy of the act of dedication.

For report of Professor Hayden's extensive explorations in the park, also including N. P. Langford's report as superintendent, see his report *Geological Surveys for 1872*.

Capt. W. A. Jones and Prof. Theodore B. Comstock explored mountain passes to, and a portion of, the park, making valuable reports and maps. (See House Ex. Doc. 285, Forty-third Congress, first session.)

In 1874, the well known Scottish Earl Dunraven made a tour of the park, and published an interesting narrative. (See his *Great Divide*.) For Secretary of War Belknap's narrative of a tour of the park, see his report of 1875.

Capt. W. Ludlow made a reconnaissance of the park in 1875. (See *Engineer's Report* published by War Department.)

For record of P. W. Norris's explorations in the park in 1875, see No. 24 and 25 of his *Journal of Rambles in the Far West*. Besides Moran, Jackson, Elliott, Gannett, Holmes, and other justly famous artists who have various times accompanied Professor Hayden's and other expeditions.

J. Crissman, Calfer & Colter, Marshall, Fouche, and other photographers, have at various times visited the park, taking and widely disseminating interesting views of the great falls, geysers, hot-spring terraces and other wonders of the park.

During all these years of exploration and research, so far as I am aware, the wisdom of Congress in promptly dedicating the National Park has never been seriously questioned; nor has its size, or its appropriate control by the Secretary of the Interior, or his rules and regulations for its protection and management, been deemed objectionable. Hence it is not what Congress has done, but what it so long neglected to do—the dedication of a lofty mountain-girt lava region destitute of valuable minerals, isolated and worthless for all else, but matchless and invaluable as a field for scientists and a national health and pleasure resort for our people, but rather the failure to make moderate appropriations for its protection and improvement until leases could be made to assist in rendering it self-sustaining, which compelled its first superintendent, N. P. Langford, to abandon all efforts for its protection, and so long allowed destructive forest fires, the wanton slaughter of its interesting and valuable animals, and constant and nearly irreparable vandalism of many of its prominent wonders. So uniform was the testimony of the civil and military officers of the government, as well as the American and European scientists and tourists who visited the park, and so strong their appeals to the nation for its protection, or at least the sending a commissioner or an agent specially empowered to investigate and report the facts, that among the early acts of the present honorable Secretary of the Interior was my appointment as superintendent of the park and special agent to again visit it and report the facts as I should then find them for the information of himself and Congress. But for want of funds available for my salary or expenses none were furnished or even promised, other than a reliance upon Congress to make provision to properly pay for performance of duties pointed out and positively required of the Secretary of the Interior in the act dedicating the park. This will, I think, appear clearly evident by perusal of the following copy of the act of dedication, the rules and regulations of the Secretary of the Interior, and my appeals to the mountaineers as published in No. 62 of the *Norris Suburban*, several hundred copies of which were gratuitously distributed throughout the regions adjacent to the park during the spring of 1877.

AN ACT to set apart a certain tract of land lying near the headwaters of the Yellowstone River as a public park.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the tract of land in the Territories of Montana and Wyoming lying near the headwaters of the Yellowstone River, and described as follows, to wit: commencing at the junction of Gardiner's River with the Yellowstone River and running east to the meridian passing ten miles to the eastward of the most eastern point of Yellowstone Lake; thence south along the said meridian to the parallel of latitude passing ten miles south of the most southern point of Yellowstone Lake; thence west along said parallel to the meridian passing fifteen miles west of the most western point of Madison Lake; thence north along said meridian to the latitude of the junction of the Yellowstone and Gardiner's Rivers; thence east to the place of beginning, is hereby reserved and withdrawn from settlement, occupancy, or sale under the laws of the United States, and dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people; and all persons who shall locate, settle upon, occupy the same or any part thereof, except as hereinafter provided, shall be considered trespassers and removed therefrom.

SEC. 2. That said public park shall be under the exclusive control of the Secretary of the Interior, whose duty it shall be, as soon as practicable, to make and publish such rules and regulations as he may deem necessary or proper for the care and management of the same. Such regulations shall provide for the preservation from injury

spoliation of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition.

The Secretary may, in his discretion grant leases for building purposes for terms not exceeding ten years, of small parcels of ground, at such places in said park as shall require the erection of buildings for the accommodation of visitors; all of the proceeds of said leases, and all other revenues that may be derived from any source connected with said park, to be expended under his direction in the management of the same and the construction of roads and bridle-paths therein. He shall provide against the wanton destruction of the fish and game found within said park and against their capture or destruction for the purposes of merchandise or profit. He shall also cause all persons trespassing upon the same after the passage of this act, to be removed therefrom, and generally shall be authorized to take all such measures as shall be necessary or proper to fully carry out the objects and purposes of this act.

Approved March 1, 1872.

(See Revised Statutes of the United States, page 453.)

RULES AND REGULATIONS.

1st. All hunting, fishing, or trapping within the limits of the Park, except for purposes of recreation, or to supply food for visitors or actual residents, is strictly prohibited; and no sales of fish or game taken within the park shall be made outside of its boundaries.

2d. Persons residing within the park, or visiting it for any purpose whatever, are required under severe penalties to extinguish all fires which it may be necessary to make, before leaving them. No fires must be made within the park except for necessary purposes.

3d. No timber must be cut in the park without a written permit from the superintendent.

4th. Breaking the siliceous or calcareous borders or deposits surrounding or in the vicinity of the springs or geysers for any purpose, and all removal, carrying away, or sale of specimens found within the park, without the consent of the superintendent, is strictly prohibited.

5th. No person will be permitted to reside permanently within the limit of the park without permission from the Department of the Interior, and any person now living within the park shall vacate the premises occupied by him within thirty days after having been served with a written notice so to do, by the superintendent or his deputy, said notice to be served upon him in person or left at his place of residence.

To whom it may concern :

Under the above laws, rules, and regulations, and my peculiar circumstances of health, long acquaintance, and business interest in those regions, I have accepted the responsible, but as yet neither lucrative nor desirable position of superintendent of the Yellowstone National Park. Have appointed J. C. McCartney, esq., proprietor of the Mammoth Hot Springs Hotel, assistant until my arrival via the Yellowstone River route, I trust in June, unless delayed by the Indians.

Meanwhile, *bona-fide* occupants of buildings, bridges, mines, &c., will, by due regard for the above rules and the future interests of the public in the park, be allowed quietly to remain. The outburst of national enthusiasm at discovery of the matchless wonders of the firehole and geyser basins, amid the Rocky Mountains, secured their prompt dedication as a national park for the weary and worn business man, the tourist, and the scientist forever; also, provision for the appointment of a superintendent under proper rules and instructions, but not the necessary appropriations to reward him for the enforcement of the other.

My predecessor, Mr. N. P. Langford, did all and more than proper to expect under the circumstances while in Montana, but with his return East all restraint ceased, and for fully two years, careless use of fire, wanton slaughter of rare and valuable animals, and vandalism of matchless wonders have, as so truthfully published in letters of myself and others, been doing irreparable injury in all the explored portions of the park.

Under these peculiar circumstances, in the interest of science and of the tourist now and in the future, the welfare and good fame of the people of Montana, Utah, and Wyoming in general, and especially to my old mountain comrades and friends, do I most earnestly appeal, to abstain, and use all influence in urging others to desist from further vandalism of all kinds in the lofty, romantic "wonder-land."

With the closing of the Sioux war, extension of the Northern Pacific Railroad, opening of the Yellowstone natural route, and the Big Horn Mountains for explorations of the vast gold and silver mines, and influx of sturdy miners and herdsmen, will soon gather wealth, build towns, and open safe and convenient routes of access to this now isolated, little known, but matchless national heritage of wonders.

That the spirit in which I write and act in this matter may extend to the press and the people of those mountain regions and the tourists who visit them is my ardent desire.

P. W. NORRIS,
Superintendent of the Yellowstone National Park.

NOTE.—The boundaries of the park have never been surveyed, but they are mainly crests of snow-capped basaltic mountains encircling the wonder-land of cataracts cañons, firehole basins, geysers, salses, fumeroles, &c., unique and matchless, with entire area from 50 to 75 miles square. N.

These rules and regulations are those adopted by the Hon. C. Delano, Secretary of the Interior, at the dedication of the park.

Under these circumstances I ascended the Yellowstone, visited most of the park and its routes of access, including the exploring of an important cut-off route; and, too seriously injured at Tower Falls to otherwise return, descended the Yellowstone from above the gate of the mountain in a skiff, and reported facts and suggestions which were merged in the honorable Secretary's report of 1877, part first, page 837, and also deemed worth a publication in pamphlet form. (See Report of the Superintendent of the Yellowstone National Park for 1877.)

After a long and careful investigation of the whole subject, and in consideration of the written opinions of the prominent scientists and explorers of our country, this cautious and prudent Congress at its first session, with a flattering unanimity, made an appropriation of \$10,000 for the protection and improvement of the park. For an account of my expenditure thereof reference is respectfully made to the appropriate chapter of this report and attached map of the park.

In addition thereto I may justly add that—unlike General Sherman in his tour of the park just in advance of last year's raid of the hostile Nez Percés, and General Howard in their pursuit, without roads—Generals Miles and Brisbin, in their military operations of this year, as well as the various parties of Professor Hayden's geological survey, the Bethold party of engineers in running a line for a branch of the Utah Northern Railroad, from Henry's Lake to the upper geysers, as well as many parties of tourists, have utilized my roads and other improvements as fast as made, thus opportunely rendering them of present as well as future convenience and benefit. With the expeditions of Generals Miles and Brisbin were Colonel Baker, Captains Baldwin and Egan, Lieutenants Douglas, Pope, Long, and other battle-scarred veterans of the Indian wars; Mrs. General Miles, sister of the wife of Senator Cameron of Pennsylvania, and other ladies of distinction; the Rev. Dr. Hoyt, of Brooklyn, N. Y., and other prominent speakers and journalists.

Besides these, Lord Stanley, English; Colonels Schultz and Koster, German; and many parties of American tourists, despite the Bannock raids, safely visited the park during the past season. The unanimous testimony of this long list of civil and military officers or agents of the government, and the scientists and tourists of our own and other lands, proves the Yellowstone National Park one of surpassing interest, a concentration of petrified forests and balmy groves, of lovely lakes, matchless falls, and yawning cañons; of azure pools and spouting geysers, unique and unrivaled—truly the peerless cliff and snow encircled wonder-land of earth, well worthy the fostering hand of the representative of our people, whose priceless heritage it is.

P. W. NORRIS,
Superintendent of Yellowstone National Park.

Hon. CARL SCHURZ,
Secretary of the Interior, Washington, D. C.

APPENDIX.

Summary of weather reports kept in the Yellowstone National Park during the season of 1878.

at portion of July which was taken would average, at sunrise, 57° ; at midday, and at sunset, 74° .

month of August, the morning average was 44° , and ranging from 32° to 60° ; at average 78° , ranging from 62° to 88° ; at sunset, average 64° , ranging from 48°

month of September, the average at sunrise, 39° , ranging from 24° to 60° ; at average 61° , ranging from 38° to 78° ; at sunset, average 51° , ranging from 74° .

first fifteen days in October average, sunrise, 41° , ranging from 24° to 54° ; mid-average 57° , ranging from 46° to 70° ; and at sunset, average 51° , ranging from 60° .

Routes and distances to the Park.

following facts and suggestions will be of practical interest to our people in reference to the only two present or prospective routes of access to their heritage of resources in the Great National Park. These are the northern or Yellowstone, and southern or railroad, and as Omaha and Bismarck alike possess the advantages of Missouri River navigation and direct railroad connection with all portions of our country, they may be properly deemed starting points upon their respective routes.

The northern route from Bismarck is still the natural one, by steamboat up the Missouri 400 miles; the Yellowstone 360, to the mouth of the Big Horn, and probably some 60 further that of Clark's Fork; and by coach 160 miles to Bozeman, the terminus and outfitting point of those regions. Thence it is by coach 72 miles to Mammoth Hot Springs, within the Park—from Bismarck, distance 1,050 miles; ascending, 12 or 14 days; descending, much less; expenses, about \$100.

The southern route is by the Union Pacific Railroad from Omaha to Ogden, near Lake, 1,033 miles; Utah Northern to Port Neuf Cañon, near Snake River, 150 miles; coach via Pleasant Valley and Virginia City, 380 miles to Bozeman, and 72 miles to the Park, or an aggregate of 1,635 miles; time, 10 days; expenses, \$200.

Saving of 30 miles can be made in the Yellowstone route by following it through the Gorge of the Mountains instead of via Bozeman; and considerable time, distance, and expense upon the southern route by entering the Park from Virginia City, 90 miles from Bozeman. With little doubt both these routes will be materially shortened during the coming season: the southern, by extension of the railroad 70 miles to the mouth of Snake River at Eagle Rock, then coach some 150 miles via Henry's Fork Lake to the Lower Geyser Basin within the Park, some 50 miles nearly south by road this year constructed from the Mammoth Hot Springs. By the anticipated connection of the Northern Pacific Railroad from Bismarck to the Yellowstone, near Mouth of Powder River, some 600 miles of river route will be exchanged for 250 of railroad; the routes then standing approximately: Northern—Bismarck to the Mammoth Hot Springs, distance 700 miles; time, 8 days; expenses, \$60. Southern—Omaha to Lower Geyser Basin, distance 1,400 miles; time, 6 days; expenses, \$100; showing that, as now, one route requires the most time, and the other the most money; but locally tourists should go one route and return the other.

Routes within the Park.

ROAD TO THE GEYSERS.	Between points.	Total.
	Miles.	Miles.
Mammoth Hot Springs to summit of the Terraces	3	.....
Obsidian Cañon	14	17
Norris Geyser Plateau	11	28
Falls of the Gibbon	10	38
Howard's road junction with southern route.	7	45
Lower Geyser Basin	6	51
Midway Geyser Basin	4	55
End of all road at the Upper Geyser Basin ..	5	60

ROAD TO THE GEYSERS.		Between points.	Total.
		Miles.	Miles.
MOUNT WASHBURN TRAIL VIA THE GREAT FALLS AND LAKE.			
Mammoth Hot Springs to the Forks of the Gardiner.....		2	.....
Cañon and Falls of the East Gardiner.....		2	.....
Black-tail Pond.....		6	10
Devil's Cut, or Dry Cañon.....		5	15
Forks of the Yellowstone.....		5	20
Tower Creek Falls.....		3	23
Old Ruin.....		5	28
Pass in east spur of Mount Washburn.....		2	30
brink of the Grand Cañon.....		8	38
Great Falls of the Yellowstone.....		3	41
Sulphur Mountain.....		6	47
Mud Volcano.....		4	51
foot of Yellowstone Lake.....		8	59
return to Mud Volcano.....		8	67
Mary's Lake.....		10	77
Lower Fire-Hole Basin.....		16	93
Upper Fire-Hole Basin.....		10	103

A trail is greatly needed from the Upper Fire-Hole Basin to those of Shoshone, Lewis, and Heart Lakes, and those upon the fingers and eastern shore of the Yellowstone, some 100 miles in length, and the Pelican Creek route of 35 miles to the East Fork of the Yellowstone, at the mouth of the Soda Butte.

As the very limited building accommodations at the Mammoth Hot Springs are all which are likely to be found in or near the Park the coming season, tourists should outfit at Ogden, Bozeman, or Virginia City, or, if reaching the Park by coach, excellent saddle and pack animals will be abundant at \$1; guide and packer, \$2 each per day.

Time actually necessary for a tour of the main wonders of the Park, ten days: twice that more enjoyable; and August the best month, although July is only marred by flies, which nearly devour the animals; September good, except a severe equinoctial storm; and October, save deep snows in the passes.

The best plan is to make the Park the main object and turning-point in a season's rambles, visiting both the Salt Lake and the Yellowstone Valley regions upon the outward or return routes.

There is now all promise of a summer post for protection from Indians, if necessary.

K,



a Pawlue Cliffs *b* Rolling of the Fort Gardiner *c* Headquarters of Superintendent *d* Mt. Washburn *e* Liberty Cap *f* M^cCurley's Buildings *g* Devils Thumb *h* Hot Spring Terraces.

MAMMOTH HOT SPRINGS, YELLOWSTONE NATIONAL PARK. WY. TER.

REPORT

UPON THE

YELLOWSTONE NATIONAL PARK,

TO THE

SECRETARY OF THE INTERIOR,

BY

P. W. NORRIS,

SUPERINTENDENT.

FOR THE YEAR 1879.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1880.

REPORT

UPON THE

YELLOWSTONE NATIONAL PARK.

WASHINGTON, *January 16, 1880.*

SIR: I have the honor to submit for your approval, and for publication, my third annual report of operations for the protection, preservation, and improvement of the Yellowstone National Park, during the season of 1879.

Vexatious delays and loss for want of various articles not obtainable near the park prompted my purchasing a steel reversible or side-hill plow, and other tools and implements, mainly in Detroit, and forwarding them to Bismarek for shipment upon the first steamboat to ascend the Yellowstone River, myself following them from Detroit May 12.

At Bismarek, fortunately failing to connect with the steamer Yellowstone (which was lost upon that trip at Buffalo Rapids), I shipped with my outfit up the Missouri River direct to Fort Benton, and thence, after forwarding it by a freighter, pressed on via Helena to Bozeman. I there organized my field party with C. M. Stephens as assistant, and with wagons and horsemen pressed forward 80 miles, reaching the Mammoth Hot Springs, in a terrific rain and sleet storm, June 12, being just one month in making some 3,000 miles by the various modes of travel and circuitous route necessarily taken.

The purchase of an excellent four-mule team, wagon, harness, &c., complete, some additional saddle and pack animals, and increasing my party to its maximum of thirty men, enabled me to speedily construct a rough log building upon the McCartney Creek for temporary use as storage and cook-room, and push inclosures for a pasture for the safety of our animals. In canvas wagon-cover wings to our house, several tents, and a lodge, we made ourselves as comfortable as possible during the remainder of the stormiest June which I ever experienced in the Rocky Mountains. This not only greatly retarded our operations in the park, but also seriously delayed and increased the expense of obtaining supplies, and rendered the roads to Fort Benton so nearly impassable that our outfit forwarded from there June 2—was only obtained by sending on other teams over 100 miles for it in the middle of July.

As shown by the sketch of the Mammoth Hot Springs and vicinity, our headquarters is upon a commanding natural mound, in a deep sheltered park of erosion, at the confluence of the three branches of the Gardiner River. Each of these descends by a succession of rapids, cascades, and cataracts, in a yawning cañon through basaltic terraces, some 2,000 feet within a distance of 4 miles, and discharging through a similar cañon, in a like distance, to the initial point of the boundaries of the park at its confluence with the Yellowstone River just below its third cañon. A portion of the cañon of the main Gardiner, and all of those of the west and middle branches, are utterly impassable for even

a bridle path. The only routes, therefore, to and from our headquarters are, first, a very rough and difficult one, over two dangerous fords—now bridged—near the forks, and past a cascade and two cataracts upon the east branch to the forks of the Yellowstone—distance, 20 miles; second, over my road of last year up the dry pass between the hot-springs terrace and Sepulchre Mountain to the geysers—distance, 60 miles; and, third, by the old road, over the mountain spurs and rugged cañons, 6 miles to the Yellowstone River, and through its second cañon and Bozeman's Pass over the Gallatin Range to Fort Ellis and Bozeman's—distance 80 miles. The summit of a natural mound some 600 feet in length, 300 feet in width, and 150 feet high, smoothly eroded for a carriage-way at each end, and a depression for a reservoir near the summit, after mature deliberation and sustained by the unanimous approval of the experienced mountaineers, I selected as the site for our block-house headquarters, where it fully commands the entire mound, valley, and terrace, within range of rifle or field artillery, and a fair view of the entire balance of the valley and all its approaches.

The water from not only all the upper hot-spring terraces, but also the McCartney, Bluff, and other cold creeks, sinks in the open cone and cavern-dotted geyserite plateau around this mound, only to burst forth a fair-sized mill stream of hissing, hot, medicinal water, just below the surrendered McGuirk block and bath houses upon the main Gardiner, some 2 miles distant, and 1,000 feet below the foot of the active terrace springs. As the rim of towering basaltic cliffs along the main Gardiner and its branches, together with the ancient and active hot-spring terraces, so nearly inclosed our building mound, the McGuirk Springs, the road between them, and 15 or 20 square miles of sheltered pasturage, that some two miles of fencing would complete the inclosure, the plan was unhesitatingly adopted. With pine, fir, and cedar material hauled from the ancient hot-springs terrace, a genuine Montana fence, *i. e.*, with posts sustained at an angle of some 60 degrees by smaller posts or legs through holes near the top, surmounted and faced by poles pinned or spiked horizontally upon them, was, through all obstacles, pressed to completion July 12, and in convenience and safety has not only already repaid cost, but is doubtless the largest and most sheltered, as well as romantic and valuable, pasturage for the cost of its inclosure now or ever owned by the nation in the mountains. Meanwhile we had planted an experimental garden of some half acre of potatoes, turnips, and other hardy vegetables, below the McGuirk Hot Springs, and by an occasional irrigation from them during the continuous dry weather after July 1, and some frosty nights after August 15, were far more successful in production than in protection from vandalism at a place so remote and hidden from our block-house, nearer which I have chosen and am fencing a site for our future hardy vegetable garden.

The old sheep and Sheep-Eater Indian trail from the mouth of the Gardiner River passed around the impassable portion of its cañon, then into and followed it to near the McGuirk Springs, and around the pine and cedar-clad border of the lower dry terrace and geyserite plateau to Liberty Cap; while the old wagon road wound around the basaltic spurs and terraces of Sepulchre Mountain, descending by a rough and dangerous way many hundreds of feet to the same point at the foot of the active hot springs. These were, as before stated, the only routes from Bozeman, and they barely passible, with immense expense unavoidable to ever render either of them passable coach-roads, never convenient or safe ones, and hence I have expended little money upon them, but have

for years been improving every opportunity in exploring, examining, and finally engineering a roadway across countless spurs and gulches along the mountain side midway between them. In this I finally succeeded, and, without sharp curvatures, carried a line of easy grades for some 3 miles, and, with only a moderate amount of bridging, constructed a road much shorter and in all respects superior to what could have ever been made upon either of the other routes at manifold its cost. This greatly facilitated the hauling of supplies and building material from Bozeman, and by hewing the timber and making the shingles upon the mountain terraces and hauling them to the site upon the mound, we had, during July, erected in first-class manner a block-house 40 by 18 feet, two tall stories high, with, for use as well as safety from mountain storms, substantial block-house lean-tos or wings upon three of the sides, and an 8-foot balcony to both stories of the other fronting the active hot-spring terraces. Upon the main building is an octagon turret or gun-room, 9 feet in diameter and 10 feet high, well loopholed for rifles, and all surmounted by a national flag 53 feet from the ground, upon a fine flag-staff or liberty-pole passing from a solid foundation through and sustaining all the stories, turret, and roof thereof. During these operations small parties of horsemen, with pack-animals, had vainly sought for Indians or serious vandalism by tourists; but removed fallen timber and otherwise improved the road and main bridle-paths to the geysers, and in assisting tourists, some of whom had tunneled through huge snow-packs upon the spur of Mount Washburn in June, and in constructing a reservoir fronting our mound; we improved the last day of July in removal to our unfinished house upon it.

Leaving my assistant, C. M. Stephens, with a small force laboring upon our house, I, upon the 1st day of August, with our main party of laborers and animals, and three wagons loaded with tools, tents, provisions, and other outfit, ascended the terrace pass upon our last year's road to the geysers, accompanied by some horsemen and one wagon-load of Idaho tourists. Immense quantities of fallen timber were removed, culverts and bridges repaired, new ones constructed, and grades, especially at Obsidian Cliffs, Norris Plateau, and Gibbon's Cañon, greatly widened and improved to the junction with the road to Henry's Lake and Virginia City, and similar improvements across the Gibbon, and through the upper cañon of the Madison to at least the western borders of the park near Taughees Pass. Through this I alone passed to the summer military post at the head of Henry's Lake and Hickman's camp of Virginia City tourists in the Red Rock Pass. Returning to my party, we improved the roads up the Madison and the Fire Hole Rivers to Mary's Lake and the Upper Geyser Basin; meanwhile the field party of Mr. R. J. Reeves for surveying the border-line of Wyoming and Montana had, under the guidance of a military escort from Fort Washakie in the Wind River Valley, unwisely left the Big Horn and Stinkingwater route as planned, and where I had guides awaiting them, and in attempting the Two Ocean Pass without guides became lost, scattered, and seriously delayed, and, though Messrs. Reeves, Dane, and McCrary, after weeks of toil, privation, and danger, succeeded in reaching the Mammoth Hot Springs via the Yellowstone Lake and Falls, still his escort and outfit became so bewildered and delayed in the swamps and tangled timber gulches near Bridger's Lake, that only the timely assistance of myself and scouts—Yellowstone Kelley, Johnson, and Manning—found and led them via Shoshone Lake to our camp at the Upper Geyser Basin. In this and other scouting expeditions much valuable knowledge was obtained of the precipitous densely timbered regions bordering the Yel-

lowstone, Hart, Lewis, and Shoshone Lakes upon both the Atlantic and Pacific slopes of the main divide, which at this point is peculiarly tortuous, but no direct route across it from the Upper Fire Hole Basin to the Yellowstone Lake. The evident necessity of such a route has, from the commencement of explorations within the park, led to greater efforts and more failures than any other trail seeking within it, and the discovery of such a route was one of the main features of my season's plan. Hence, leaving my party engaged in constructing a loopholed, earth-roofed log-house and other improvements in the Upper Geyser Basin, I, alone, or with only one scout, commenced searching for a route, during which I found the odometer left in 1873 by Captain Jones and Professor Comstock, upon the nearly vertical face of the main divide overlooking Shoshone Lake, where seemingly only Noah's Ark or Bridger's famous foraging crow would have ever left or be likely to remove it, and amid the dense snow-crushed, storm-twisted, knotted and gnarled thickets of the continental divide, traces of Everts, Hayden, and other explorers, but no practicable route across it, and returned to the Fire Holes.

Thus baffled as had been all previous explorers, I, as a last effort, ascended the north bank of the Fire Hole River, past a succession of enchanting rapids, cascades, and cataracts, and after some days of excessive exposure and hardship, and nights of sleepless cold and anxiety, was rewarded by more than hoped-for good fortune in tracing a chain of small mountain and timber-hidden parks, and lovely lakelets, to a narrow timber-hidden, but deep, direct, and excellent pass, which within less than 2 miles crosses, or rather cuts, the main divide from the Fire Hole waters of the Atlantic to a sheltered grassy park near Shoshone Lake, and the spring and rivulet fountain-heads of the Columbia of the Pacific. With buoyant hopes I sought a similar pass in the opposite bend of the divide, but finding none nearer than Lewis Lake, I ascended it by a somewhat zigzag but not difficult route, and within 5 miles reached the summit near one of those crater-like ponds or noted Two Ocean Lakes, without outlet, and by similar grades descended the eastern slope. Reached the Yellowstone Lake at the western end of its great thumb, near the hot spring terraced beach, famous as convenient for catching the large lake trout, and without changing one's position or removal from the hook, thoroughly cooking them in nature's boiling pots within one and a half minutes from the time they were sporting in the crystal waters of the lake, as I have for years by actual experiment demonstrated to the incredulous. Returning, I opened a trail from the cascades to Old Faithful, at the head of the upper Fire Hole Basin, there finding several parties of tourists. One of these, including the wife of Postmaster Taylor, Mr. McAdow, a prominent miller, and several youthful members of the families of General Willson and other leading citizens of Bozeman and the Gallatin Valley, is deemed worthy of special record; as, though many ladies had for years visited the geysers upon horseback, and the Smith and Woodworth party, with ladies, had recently visited them in wagons from Virginia City, these were the first ladies to reach Old Faithful by wagon upon our road from Bozeman, and who upon horseback—August 27—were positively the first ladies who, by any mode or route, ever visited the cascades of the upper Fire Hole River, 3 miles above Old Faithful. Leaving my excellent trainmaster, J. E. Ingersoll, in charge of the main party, with instructions to complete our building and then improve the roads in returning with the wagons to the Mammoth Hot Springs, I, with six picked mountaineers and a small pack-train, opened the recently explored route an estimated distance of 10 miles to Shoshone Lake, and 12 additional, or in the aggregate 22 miles

from the Upper Fire Hole, twice across the continental watershed, to Yellowstone Lake. Thence I opened a trail, much of the way through fallen timber, along or near the western shore of Yellowstone Lake some 26 miles to its outlet, and improved the old one some 60 miles via the Mud Volcano, Sulphur Mountain, Great Falls, Cañon, and Forks of the Yellowstone, Mount Washburn, Tower Falls, and cañon of the East Gardiner, to our headquarters upon the mound September 7, finding our wagon train safely returned. Thus, after an absence for most of the party of 38 days of nearly continuous good weather and active and successful operations, without seeing an Indian or losing a man, and, from experience, using camp and pocket filters for bad or unknown water, but no alcoholic stimulants, all returned in excellent health, with no mishap greater than having some of our men and horses for a time lamed by scalding in the fire-holes, and having one of the latter, when thus crippled, devoured by grizzlies. Aside from a fair supply of bacon, trout from the cold springs, not mineral, the flesh of deer, elk, antelope, bear and other animals, and birds killed with the rifles, were our only, but excellent and ample, supply of animal food.

The limited appropriation under my control not justifying continued employment of so large a party, I regretfully discharged many excellent men to whom, from jointly sharing toil and camp-fire, I had become greatly attached and whom I would gladly and profitably have retained.

SCIENTIFIC SPECIMENS.

During the entire season's operations I had carefully—often with great effort and hazard in cliff and cañon climbing—secured rare and interesting specimens from the various geysers and other hot spring formations, obsidian cliffs, fossil forests, and Sheep-Eater haunts, intended for the Smithsonian Institution and the Anthropological Society of Washington, and other scientific associations. These, after carefully packing in five boxes, were securely bound with rawhide thongs, and in September, sent from the Gate of the Mountains upon the Yellowstone by some men who were returning from my employ to the States in a small Mackinaw boat. But, unfortunately, they were, in the unusual low stage of water, wrecked at the Buffalo Rapids; and, though it was reported that these specimens were landed, I have failed to obtain reliable information regarding them, and greatly fear their total loss to science and the world.

GUIDE-BOARDS.

The original cost of lumber and added heavy freightage, nearly 80 miles from Bozeman, precluded the use of more than was absolutely necessary. But all fragments were carefully preserved, well dressed, painted white, and then black-lettered with the names of the most important streams, passes, geysers, &c., and tables of distances between them. These were carried by wagon, pack-train, or on horseback, and firmly affixed to rocks, trees, or durable posts, proving of great value to tourists throughout the park; but many more are needed.

Leaving a small force building a corral and bridging the Gardiners near their forks, I, with the rest of the party, spent the remainder of September in improving the trail past the forks of the Yellowstone, 35 miles to the Soda Butte, and making a new one across Amethyst Mountain and the Fossil Forest, some 30 miles to Pelican Creek and the foot of Yellowstone Lake. Returned, outfitted, and having completed a very necessary bridge over Tower Creek above the falls, was actively open-

ing a trail between the Grand Cañon and Mount Washburn when an unseasonably severe snow-storm of October 9 compelled suspension of important field operation for the season, and, leaving some of our tools, we gladly pushed, in a terrific storm and through dangerous snow-drifts, to our excellent headquarters at the Mammoth Hot Springs. Although the snow soon melted in the lower valleys, and mainly so around our Hot Springs, still it continued too deep and the weather too stormy in all the mountain passes for profitable or even safe employment of laborers, and few were retained, the remainder of the autumn being spent in exploration of the park, including a thorough reconnoissance of the gold, silver, lead, and copper mines in the Montana portion of the park, in hauling our winter supply of provisions, forage, and fuel, and sketching and mapping our building site—the hot-spring terrace and surroundings.

In exploring routes, and hunting, killing, and packing game into camp, often through dense thickets of fallen timber, fire-hole basins, or yawning cañons, the hardships, dangers, and exposure to broiling sun and biting frost, or lonely camp-fire in unknown snowy regions, were ever chosen as pastime by our mountaineers, and the attendant incidents of such trips, including the nimble dodge from a wounded buck, or hasty tree-climbing from a ferocious grizzly, forms the standing basis for camp-fire stories or legends of the days ago. Such romance and enjoyment this season was, for the first time in the park, unalloyed by Indian raids or serious accidents or mishaps; but, as of little general interest, seldom mentioned in my reports or letters. But, of the animals killed during the past season, were some very large and fine elk, deer, sheep, and antelope, and a mountain lion, shot in the night to prevent his molesting our animals, which measured nearly 9 feet in length from lip whiskers to tip of tail, and the last of the six grizzlies killed by myself during the past season, was a remarkably large and fine one. A fine young horse, somewhat lamed by scalding in the fire holes, having been left near Obsidian Cañon, was killed by a grizzly, that, in devouring the carcass and fragments of game killed in the vicinity, continued to haunt the place. In trailing him in snow nearly knee deep some weeks afterwards, I killed two large antlered elks, but a few yards apart, and, it being nearly night, I only removed their entrails and camped alone near them, confident that bruin would visit them before morning. I then found that he had dragged the elk so near together as to leave only a space for a lair of boughs and grass between them, which he was intently finishing, when I, at a distance of 100 yards, opened fire with a Winchester rifle with fourteen ordinary bullets in the chamber and a dynamite shell—being all which I dared to use at once in the barrel. This I first gave him high in the shoulder, the shell there exploding and severing the main artery beneath the backbone. He fell, but instantly arose with a fearful snort or howl of pain and rage, but got four additional ordinary .44 caliber bullets in the shoulder, and nearly as many falls before discovering me, and then charged. Hastily inserting another dynamite shell, I, at a distance of about 50 yards, as he came in, sent it through his throat into his chest, where it exploded and nearly obliterated his lungs, again felling him; and as he arose, broke his neck with the seventh shot. Either one of these would have stiffened any other animal, and surely have soon proved fatal to him; but deeming delays just then dangerous, I peppered him lively. Finding Stephens across Beaver Lake, we returned with our saddle and pack animals, and after killing a pair of wood martens that were preying upon the carcasses, we dressed the animals, packing all possible of them 20 miles to our block-house at the Mammoth Hot Springs. We there found

the hide of the bear just as spread out, without stretching, to be $8\frac{3}{4}$ feet long from tip of snout to roots of tail, and 6 feet 7 inches at its widest place; and from his blubber brought in, Stephens tried out 35 gallons of grease or oil. Its extraordinary size is the only reason for at all mentioning the animal in this report.

As the geyser regions are nearly unknown in winter, I had constructed our comfortable log-house in the little grove between the castle and the Beehive Geysers in the Upper Fire-Hole Basin, with a good stone chimney and provided abundance of fuel, proposing to remain there, obtaining much valuable information and sketching them and the lake regions in winter, and during it returning via Henry's Lake to Camas Station upon the Utah Northern Railroad. But finding the sulphur-charged condensed steam and fogs of the Geyser Basin were too suffocating to long endure, and that the unusual deep snows had seriously blocked the passes and gorged the Madison and other streams in their cañons, the project was reluctantly abandoned; and, returning to the springs, final arrangements for winter were made. I then left my ever-faithful and efficient assistant, C. M. Stephens; my son, A. F. Norris; and J. Davis to occupy the house upon the mound, finish the upper floors and partitions during bad weather, and, when favorable, prepare for division-fences and bridges for next season, make a snow-shoe trip to the geysers during the winter and carefully protect the game from wanton slaughter.

As no white men have ever spent the entire winter at the Mammoth Hot Springs, it is not certain that more than the saddle animals, for which we have a corral and forage, could safely remain there, and hence the mule team will be partially wintered at Cedar Creek in the second cañon of the Yellowstone, in charge of some reliable men who will, as usual, there winter their own. I then proceeded to Bozeman, closed the season's outfitting business, provided for occasional mails to the men in the park, and thence to Beaver Cañon at the terminus of the Utah Northern Railroad, and via Ogden to Cheyenne. Thence, after pleasant interviews with Governor Hoyt, the present and the ex-Delegate, and other officers of Wyoming Territory, and also prominent railroad officials in Cheyenne and Omaha, in reference to railroad, post, and coach routes and other matters of interest to the park, took the usual railroad route of return.

EXPLORATIONS.

While, by the language of the act appropriating funds, as well as my instructions for its expenditure, protection and improvement of the Yellowstone National Park appear more prominent than its explorations, still, practically, considerable of the latter is indispensable for an intelligent and judicious performance of the former; the real danger, indeed, being a deficiency rather than an excess of knowledge of the local peculiarities of that wonderful region prior to expenditure upon buildings, roads, bridle-paths, and other permanent improvements. Yet with the small amount of funds under my control for the vast improvements necessary to enable the prominent men of our nation to conveniently visit and personally judge of its wonders, its necessities, and its management, I have pushed improvements, devoting less time and funds to exploration than desirable to myself, or, I fear, ultimately the most beneficial to the park. Still, our carefully kept records of weather, long observance of storms, earthquake shocks (of which there was only a slight one, during August of the past season), formations, eruptions, and decadence of geysers and other hot springs, changing terraces and other phenomena, rapidly accumulates valuable information of the local climate and pecu-

liarities, which, with constant vigilance in the management of foraging and other expeditions, steadily adds to our knowledge of the approaches to, and routes of travel throughout, the park. In addition to the exploration of the new route down the Gardiner River, and the Shoshone route to the Yellowstone Lake, heretofore necessarily mentioned, others of interest and value have been made during the past season. As not before suspected, although within 3 miles of our block-house, the lower of the three falls of the East Gardiner has, like the famous Minnehaha, a clear safe passage between the sheet of descending water and the wall rock. In excavating for our cellar, on the mound near the Mammoth Hot Springs, we unearthed a circular deposit of several bushels of beautiful white bead-like shot or pebble specimens, some of which I have brought away to learn if they are the petrified eggs of some ancient reptile, or, as I am inclined to believe, the berries of juniper or cedar, doubtless long antedating those of Solomon, from Lebanon.

RUSTIC FALLS.

Another of the season's discoveries is a rustic fall upon the West Gardiner, near the summit of nature's rocky fence to our pasturage. This small snow-fed stream, from its bridge on our road to the geysers, flows quietly through a grassy margin in an open sage plain nearly a mile to its border, and then glides some 40 or 50 feet down a mossy rock, so smooth, so placid, and so noiselessly as to present to one standing afoot or astride, as can easily and safely be done upon its very margin of mist-nourished ferns and flowers, a contrast unique and matchless, to the succeeding 1,500 feet of its dashing, foaming descent adown a yawning cañon waterway, in magnitude out of all comparison to that now flowing there. In the open valley above are the decaying lodge-poles of an old Sheepeater camp, and upon a timbered ledge overhanging these falls, are decaying poles, driveways for game, and coverts for concealment in using arrows.

CAÑON AND FALLS OF THE MIDDLE GARDINER.

The main falls upon the middle, and far the largest fork of the Gardiner, has a clean vertical descent of near 200 feet, and the basaltic cliffs for miles tower nearly or quite vertically, often in church-like battlements and spires, from 1,000 to 1,500 feet above the foaming white torrent at the cañon's base, scenery second only to that of the Grand Cañon of the Yellowstone within the park, and seldom rivaled elsewhere.

After several failures, I this season succeeded in finding a route along the terraced base of Bunson's Peak, overlooking this cañon. This, with little increase of distance, strikes our road to the geysers, some 7 miles from our block-house, a route well worthy of and, I cannot doubt, destined to soon be occupied by a tourist's carriage-way.

SHEEPEATER HAUNTS.

This cañon, above as well as below the main falls, had been, by us, deemed inaccessible until during the early snows of last autumn, when I, alone, in trailing a wounded bighorn, descended a rocky, dangerous pathway only, in rapt astonishment, to find, by the scattered fire-brands and decaying lodge-poles, that I had thus, unbidden, entered an ancient and but recently deserted, secluded, unknown haunt of the Sheepeater aborigines of the park. It was fully a half mile in length, some 400 feet at

its greatest width, and very much deeper, and so hemmed in and hidden by the rugged timber-fringed basaltic cliffs of a spur of Benson's Peak, that accident, or the trailing of men, or, as I did, of animals, would have ever led to its discovery. Within it are terraces of ancient hot springs and crumbling cones of extinct pulsating geysers, similar to, only much smaller than, those of the Mammoth Hot Springs and Liberty Cap below; also some active hot springs. But it is mainly carpeted with short grass, dotted, fringed, and overhung by small pines, firs, and cedars, and with the subdued and mingled murmur of the rapids and cataracts above and below it and laughing ripple of the gliding stream is truly an enchanting dell; a wind and storm sheltered refuge for the feeble remnant of a fading race, who, from evident traces, have certainly hidden here since we have occupied the Mammoth Hot Springs in utter ignorance of their proximity, although less than 6 miles distant. As only with difficulty and danger horses can descend into this and similar dells, or, for want of pasturage, long remain in them, as well as from the numerous pole drives for animals and bush screens for silent arrow shooting, often found in the park, it is evident that these harmless hermits, these "wild men of the mountains," were, until very recently, destitute alike of horses and of fire-arms. The nearly as ragged as beaver-gnawing stone or obsidian knife and hatchet marks upon decaying lodge and wickiup-poles, as well as upon ancient charred semi-petrified timber, prove they were also destitute of steel or iron tools and implements, and that, as we still do, they often used charcoal for fuel to avoid betrayal of their hidden camps by smoke; and the constantly discovered decaying evidences of lodge and wickiup or cliff-sheltered bush-houses, in the hidden glens and recesses of the mountains, indicate that, even recently, their numbers greatly exceeded the usual estimate of 100 of these peculiar people. Although so timid and harmless, when destitute of horses, fire, and other arms, and vices of white men, they have, with them, developed into as dexterous horse-thieves and dangerous cliff-fighters as any other clan of the Bannocks or Shoshones, from whom they seem to have been ancient offshoots, or occasional refugees. Indeed, it seems probable that some of the guides in Joseph's Nez Percés' raid, and certain that many of the Bannocks of last year, were native hermits of the park, far less anxious for hair than horses, and their tell-tale guns, though more efficient, less safe than their obsidian-headed spears and arrows, not allowing them to remain there in concealment from our frequent and usually fruitless pursuits of them. But they have desperately fought the miners in the Salmon River Mountains during the past season, and only our well-known preparation for their obtaining more lead than horses, and the summer military camp at Henry's Lake, prevented their seriously annoying tourists within the park.

CROW INDIAN RESERVATION OR CONFLICTING BORDERS.

From the foregoing sketch of the Sheepeater Indians, it is evident that they who so silently vanished without a contest for possession or a treaty for the cession of their ancient haunts were ever a harmless race of cliff-climbers, dwellers in caves, in lodges, or in bush-wickiups, in secluded parks and glens of the mountains, and nearly destitute of horses and fire-arms, while even those called Mountain Crows—as distinct from those upon the Missouri—have long been well supplied with both horses and fire-arms; are splendid horsemen, crafty horse-thieves, and able, determined warriors, in defense of their hereditary buffalo

range upon the plains and valleys of the Bighorn and the Yellowstone below the mountains. Hence, the natural and ever-recognized border of these clans was the elevated, remarkably rugged, unbroken snowy range from near Pilot Knob through the great bend of the Yellowstone to its first cañon, or gate of the mountains. This range the Crows seldom crossed, never occupying the slope toward the park or claiming ownership, save as under the conditions of a treaty with them made at Fort Laramie, May 7, 1868, when, doubtless for convenience in an unknown region, the Yellowstone River was followed up to its crossing of the 45th parallel of latitude, and thence eastward along it between the Territories of Montana and Wyoming as its southern border, and including some of these Sheepeater lands.

Upon this portion of the Crow Reservation were the well-known Emigrant Mines, the owners of which continued to be viewed and treated by the Crows as they were received in 1864, not as intruders, but as welcome friends and allies against their common foes, the Blackfeet, Sioux, and other hostile Indians, and have never been molested.

The miners upon the Bear and Crevice gulches, and subsequently those of Soda Butte and Clark's Fork, also upon the Sheepeater lands, like those of Emigrant, have never been molested by the Crows, and like them, with seeming reason, claim the want of original ownership and continued immunity from molestation by the Crows as acquiescence by them in the miners' rights or claims.

March 1, 1872, or nearly four years after this Crow treaty had been confirmed, the Yellowstone National Park was dedicated, fixing its northern border, not on the 45th parallel or upon the southern line of the Crow Reservation, but, in ignorance of where that line would really prove to be, fixing the confluence of the Yellowstone and the Gardiner Rivers as the initial point. This complication of rights, boundaries, and jurisdiction becoming more evident with occupancy and management of the park, I, after two ineffectual efforts in my annual reports for a remedy (see pages 9 and 10 of my report of 1877, and page 9 of that of 1878), addressed a letter as follows:

WASHINGTON, D. C., *February 18, 1879.*

SIR: I have the honor to respectfully present the following reasons for the speedy survey of the boundary line between the Territories of Wyoming and Montana.

First. Those usual for judicial and other purposes for contiguous regions.

Second. For the protection and management of the Yellowstone National Park, especially at its headquarters and main route of access to adjacent settlements, mining camps, tourists, and trappers, evidently difficult, if not impossible, without its boundaries at that point, and the operations of its necessarily anomalous rules and regulations being known by all parties. Should this Territorial line be found not identical with that of the park as now dedicated, it will be near enough for all practical purposes until further legislation can make it so, thus obviating much present and future complication and expense.

Third, and perhaps most pressingly important, fixing the southern border of the Crow Indian Reservation. As the Crows are, and ever have been, our firm friends, as well as valuable allies upon several recent critical military occasions, the necessity is evident and urgent that the proposed border line be soon run, to prevent the threatened incursion of white ranchmen upon the Big Horn and Little Horn Rivers, the finest game, grazing, and agricultural portion of their reservation (where alone they can ever be concentrated and civilized), and for want of which proposed line there is *certainly* of grave and costly complications and *danger* of a future Indian war.

Most respectfully, yours,

P. W. NORRIS,

Superintendent of the Yellowstone National Park.

HON. J. A. WILLIAMSON,
Commissioner of the General Land Office.

This letter was promptly indorsed by the honorable Commissioner of the General Land Office, of Indian Affairs, and Secretary of the Inte-

rior, submitted by the Speaker of the House of Representatives, an appropriation made for its survey, and the western and most important portion completed by Mr. R. J. Reeves before winter. This survey clearly shows that the park, as dedicated, embraces a $2\frac{1}{2}$ -mile strip of Montana, which, from the crossing of the Yellowstone River easterly, had been for nearly four years embraced by the Crow Indian Reservation, and also, as just shown, mainly occupied by miners, who had quietly dispossessed the original Sheepeater owners, and under their claims of possession are steadily proceeding in development of the mines by prospecting, organizing mining districts and companies, sinking shafts, constructing arastras and smelting-works, and purchase and sale of property as openly as in any other mining region of our country, and doubtless interesting distant capitalists who are mainly ignorant of these complications of jurisdiction and ownership.

Unquestionably treaties should be solemnly observed, or by mutual agreement promptly modified, and laws strictly enforced until properly repealed; and in this case, where the real priority of rights and jurisdiction is so evident and rival interests so diverse in character and purposes, it is hoped that an amicable adjustment of them all can in due time be effected upon the following basis:

First. By changing the northern and western boundaries of the park, as recommended in the boundary section, so as to conform to those of Wyoming Territory, thus at once severing an unnecessary 3-mile strip upon the west, and also the $2\frac{1}{2}$ -mile strip of mining region upon the north, and leaving the park clear of an antagonistic mining population, questions of jurisdiction, and its two most important boundaries run, well marked, known, and recognized by all parties, without cost to the park.

Second. By honorable treaty with the Crows, obtain a recession of the old Sheepeater mining portion of the Great Bend of the Yellowstone above the Gate of the Mountains, by satisfactory remuneration if necessary; for though, as above shown, not theirs originally, or ever by possession, yet it surely is by honorable treaty, and although less liable to lead to hostilities than where the parties oftener meet along the river, still unrestrained license, even under seeming palliating circumstances, upon one portion of the reservation invites trespass elsewhere, and with the sensitiveness of the Crows from wanton encroachments along the river below, may, from a spark in the mines, kindle a flame only quenched in innocent blood. Hence, for an honorable adjustment of these various conflicting claims of priority of title and of jurisdiction in behalf of private rights and national development, and in the interest of humanity towards the Crows, who, despite isolated individual acts of violence for plunder or revenge, have as a tribe ever been our true friends; for the safety of the industrious pioneers upon the border and their innocent families, who are usually the victims in Indian wars; for the security of government agents and property, as well as of tourists within the park, I feel the necessity of urging the above or other mode of adjustment, and also prudence, forbearance, and conciliation by all parties interested, pending negotiations for its consummation.

ANCIENT AND RECENT MAMMOTH SPRING TERRACES.

Some early scientific visitors of these regions believed that the matchless terraces at the Mammoth Hot Springs were formed by limestone precipitated in the still waters of an ancient lake, and there horizontally stratified. But this theory was soon supplanted by the evidently correct

one, that they are wholly formed by deposits from hot-spring waters issuing from the funnels of long, tortuous escape-vents of a huge, deep-seated fissure in the carboniferous limestone, and thence along its line of contact with the more recent cretaceous, tertiary, and lava deposits, to where their elevated edges are eroded by the forces which carved the yawning cañon of the Gardiner River, as well as those of its three branches, and the eroded park-like valley at their confluence. As this newly-centered and all-powerful internal pressure was mainly through carboniferous limestone, the dissolving of the walls and enlargement of water-clogged vents or orifices, and consequent building up of cavernous terraces, resulted in not only filling up the cañon gorge of the West Gardiner, but actually building a mountain barrier two miles broad, connecting Sepulchre Mountain with Bunsen's Peak, forming an elevated lake, the main outlet of which was for a time around the latter into the Middle Gardiner at the Sheepeater Cliffs. From the plateau summit of this Terrace Mountain the lime-charged hot waters, at the period of their greatest power, descended in pulsating throbs over its rapidly-forming, beautifully-white, calcareous, scollop-bordered bathing-pools, with terraced slopes nearly 1,000 feet to the mountain lake above, and fully 3,000 feet to the cañon of the main Gardiner River below. Along or near the latter are the various McGuirk Springs, certainly the largest in that vicinity, but their waters are not lime-charged and terrace-building, but medicinal—deemed valuable for rheumatism and similar diseases—although a portion of them are perhaps somewhat connected with the sinks of the terrace springs above. But to this accepted, and doubtless mainly correct, theory of the waning power and continuous downward march of the focus of the modern terrace-building springs, there is abundant evidence of secondary or independent agencies at some remote period, heretofore unrecorded, if indeed thoughtfully observed by scientists, to which I invite their candid investigation. For fully one mile along the main Gardiner River, near the McGuirk Springs, always one and often both of its banks are bold terraces or eroded cavernous cliffs of ancient hot-spring deposits, clearly revealing their laminated structure and central orifices or cones, and overlooked by the now pine and cedar fringed lower terraces, aggregating nearly one thousand feet in elevation. The southern portion of these are now shattered or eroded into galleried halls, hidden grottoes, or tottering columns, and balustrades, unique, unrivalled, and incomparable save to the crumbling ruins of an ancient temple.

At a more recent period the geyserite plateau from the head of these lower terraces was a huge pool or shallow lake of foaming hot water, dotted with fumaroles, salses, and pulsating geyser cones like the Devil's Thumb or Liberty Cap. The base of the latter and nearly all of the former, and an unknown portion of the upper end of this plateau, are now covered by the descending upper terraces, through many portions of which the not decaying but semi-petrified steam and storm abraided tops and trunks of pine or cedar forests still protrude. The still visible portion of the geyserite plateau, for fully a mile in length and one-fourth of a mile wide, sounds hollow and cavernous to the tread of men or animals, and is dotted with yawning, often dwarf-timber fringed sink-holes, or crumbling basins of extinct geysers and other hot springs, of all dimensions to one hundred or more feet in diameter and fully half as deep, after exhibiting beautiful stalactite formations. In one of these conical sinks a huge antlered elk sought a covert, probably during a drifting snow-storm during the past winter, and by the sudden settling of the snow-pack became entrapped by its overhanging walls and

perished from the effects of poisonous gases or starvation, and only by the use of ropes were the finest pair of horns which I ever saw obtained. But, unlike all other known extinct geyser or other hot-spring formations, this plateau and the upper portion of its lower terrace borders bear no evidence of waning power or dwindling supply of water or of deposits, and comparatively little of age, crumbling, or erosion, all seeming as though the powerful operating forces or agencies had been brought to a sudden and permanent suspension.

Believing that for effects so evident, so anomalous, and geologically recent, the cause was neither remote or unfathomable, I have for years been upon the alert for a clue, and perhaps obtained it. The once seething, now pine, fir, and cedar fringed plateau summit of the Terrace Mountain affords from its near 9,000 feet of elevation a view of not only one of the most beautiful and romantic of earthly landscapes, but also matchless opportunity for tracing the evidences of the successive operations of molten lava, seething, calcareous, hot, and escaping torrents of cold water and the eroding outline-rounding effects of the frosts and storms of a sub-alpine climate. The terraced slope of at least the upper half of the lower or northern and eastern sides of this mountain are now covered with a dense growth of small but beautiful cedar, pine, balsam, and red fir timber, the upturning of which uniformly reveals ancient terraces and bathing pools with scallop borders, in form and coloring as beautiful, and from being purer limestone harder, and often sharper cut outlines than those now forming thousands of feet below them, and thousands of years more recent. The western and equally steep slope shows upon its grassy surface not only the abrading effects of the prevailing storms, but also, upon at least its lower portion as well as upon that of Bunsen's Peak, unmistakable traces of ancient shore lines of the mountain lake. To the south is the yawning cañon of the West Gardiner, torn along the line of contact of Bunsen's Peak and Terrace Mountain by the escaping waters of this mountain lake, which by undermining precipitated enormous land-slides from each. A search for animals upon hundreds of acres of our eroded valley pasturage below this cañon gorge will require sufficient climbing over and among the rocky debris of these enormous mountain slides to convince the most superficial observer of their reality and the clear-cut sky-line of the white cliffs, so noted a landmark for many miles, even from the mountains beyond the Yellowstone, are only the nearly 1,000 feet vertical face of the marbleized calcareous hot-spring formations of the Terrace Mountain still remaining. That while this Terrace Mountain was the only barrier between the mighty pressure and lashing waves of the mountain lake, a portion of its waters at an elevation of some 3,000 feet above McGuirk's Springs, less than four miles distant, should, after the focus of internal pressure had in its waning power descended below that of the lake, percolate either through its calcareous formations or along the unconformable line of contact of this Terrace Mountain, with one or both of those abutting it, seems very probable. If this be true we have a ready solution of the question as to the cause of the enormous deposits along Gardiner River, the Geyserite Plateau, Liberty Cap, and other geyser-cones, fumaroles and salses, and in cutting off the supply of water by drainage of the mountain lake, the evident cause of the sudden and final suspension of activity in all of the springs thus supplied. Additional support of this theory is found in the boggy lakelets of the West Gardiner Valley, above this cañon, and notably along our road near the Terrace Pass. This portion of it discharges, not to the West Gardiner, but from very near it in the open val-

ley, still drains into a marshy pond or shallow lakelet so hidden in a notch of Terrace Mountain that upon my first exploration of it, when returning from the Fire Hole regions (1875), I was greatly surprised to find a smooth, dry, elevated pass along the line of contact with Sepulchre Mountain instead of a ragged cañon waterway, as at the other flank of the Terrace Mountain. That this pond is the reservoir for a small quantity of water still percolating beneath this pass seems probable, and that the volume of water in the now active terraces, and at least the upper McGuirk Springs, varies with the seasons and supply is too evident to doubt; but the connection or sympathy of the supply of water above and its discharge below the mountain, although probable, is not fully established by continuous observation and record. Should it become so, important results may soon follow. As from personal observation I believe the West Gardiner can be easily and cheaply turned from its cañon out of the side of Sepulchre Mountain into the little lake so as to render it a permanent supply reservoir, it becomes a problem of great scientific interest and practical importance to learn, if possible, whether the supply of internal heat and power be still ample and the subterranean connection sufficient to increase the power actively and consequent amount of deposits in any or all of these hot spring terraces and pulsating geyser cones, and renewal of their ancient beauty; or, perchance, only to enlarge the subterranean channel to the great spring on the Gardiner River, and thus hasten the descent and perhaps extinction of the still active terrace springs. Deeming the responsibility of thus forming a mountain reservoir too great to assume without further observation, consultation with practical scientists, and, perhaps, careful experiments, the subject is dismissed with the earnest hope that these candid statements and suggestions may lead to thorough scientific research and beneficial results.

OBSIDIAN MOUNTAIN.

I this year traced the mountain of obsidian or volcanic glass from where I discovered it last year, at Beaver Lake, to a branch of the Gibbon, below the Lake of the Woods, a distance of some eight miles, proving that it is there the true divide of the waters of the Missouri and the Yellowstone, and also a vast weapon and implement quarry for the ancient hermit Sheepeaters.

GEYSERS AND OTHER HOT SPRINGS.

The new crater which burst forth in the Norris Geyser Plateau, with such upturning and hurling of rocks and trees, August 11, 1878, and was for the remainder of last year a high crater of hissing gas, steam, and mud, seems this year to have settled down to business as a very powerful flowing geyser, having, in common with many others, a double period of eruption, one some 30 feet high about each half hour, and another of nearly 100 feet and long continued, each six or seven days, and is doubtless still changing. Countless hot springs and some important geysers were this season discovered on this plateau and its mountain rim, and enough red pulsating geysers in its upper cañon of the Gibbon to justify a tourists' trail through it. In fact, this geyser region seems to occupy some 20 or 30 square miles, being not only the largest and most elevated, but probably oldest and once most important, of any within the park. It is apparently also the hottest, not only from the thermometer readings, but its effects upon persons crossing them; and while the other

basins were, in November, enveloped in chilling, suffocating fogs, with more than two feet of snow upon Mount Schurz, between them this, though shrouded in steam and mist, was wholly clear of snow, grass luxuriant, and the streams and ponds, not too hot, alive with ducks, geese, swan, pelican, and other water-fowl. The second largest of the great midway springs, which last season, unwitnessed, certainly exhibited the greatest geyser-eruption of which we have any evidence, was, this season, as previously, not only a seething lakelet with a huge outlet of hot water, but its denuded margin and remote border of water-hurled rocks unmistakably proves it the prince of geysers when semi-occasionally aroused. I have neither personal or other satisfactory evidence that the Giant or Giantess exhibited a full old-time eruption during the past season, and though such may have occurred, and for a time may continue at long, uncertain intervals, still I incline strongly to the opinion that they, as well as the Lion and others, have passed the period of their greatest power, and will be slowly, but surely, supplanted by others. Old Faithful, though still the favorite geyser, has certainly lost prestige by an occasional prolongation of its intervals between eruptions of from five to fifteen or twenty minutes during the extreme dry weather of the past season; but whether it is temporary for want of water, or permanent from change of supply fissures or other cause unknown, time alone will determine.

The route from Old Faithful to the Yellowstone Lake will render accessible the hot springs upon the latter and upon the Upper Fire Hole River, above the cascades, and, with a short line of bridle path, those of the Shoshone, Lewis, and Heart Lakes; while the Pelican Creek route connects its sulphur basin and those of Turbid Lake with those of the famous medicinal springs upon the Soda Butte.

PLACID WARM STREAMS.

Few of the anomalous features of this *land of wonders* are of greater scientific interest or of more practical value than the placid, uniform water-flow in its hot spring and geyser-fed rivulets and streams. While the Black Tail, Tower Creek, various branches of the Gardiner, and other cold snow-fed streams, are, as in other mountain regions, bold, dashing torrents, subject to terrible ice gorges and overflows; the main Gibbon and its geyser-fed branches, all the Fire Hole Rivers and the Madison from its head, at their confluence, to where its waters chill below the upper cañon, are alike dotted with grassy meadows in their channels, covered with floating bubbles and clear of ice gorges and floods. True, an able and esteemed scientist, in his exploration of these regions, queried if the peculiar appearance of timber in some of the Fire Hole valleys was not evidence of occasional severe floods; but careful and continuous observation leads me to the conclusion that the penetrating, semi-petrifying effect of local overflows, or capillary infiltration of timber, from many of the hot mineral springs is, and has ever been, so great that even standing timber may long outlast the eruptions and even accompanying springs. But I fail to find evidence of recent widespread overflows, by either hot or cold water, of the main streams in any of the hot-spring valleys. Although these mineral waters are all in elevated snowy regions, mingled with the cold mountain torrents, and are really rapid streams with an occasional cascade or cataract, yet an observant tourist will at once note their broad, shallow, grassy channels, uniformly smooth banks, with a dense growth of short grass and flowers, carpeted to the water's brim, and total absence of bayous, mud-banks, driftwood, or other evidence of overflowing waters. Thus the

stretches of long flowing grass and occasional hot-spring pools in the channels and the actually overhanging turfy banks are usually the main obstacles in crossing these streams; and hence the cutting of a sloping way through the turf usually forms an excellent and permanent ford, thus greatly reducing the necessity for bridges. In fact, long limber poles and foot-logs, only a few inches above the low stage of water in several of these streams along our road to the geysers have thus safely remained during two seasons, and even poles, levers, and hand-spikes by us left last year at the very water's brink are still there undisturbed. Even the Gibbon, in its great cañon, through a snowy range and uniformly very rapid, averaging at least 100 feet wide and knee deep, with two cascades, has the ever interesting feature of countless, huge, often pine and cedar clad mountain boulders, so eroded at the base by this impetuous, changeless volume of warm mineral water as to appear like inverted sugar loaves or huge fossil eggs, erect upon their smaller ends, tottering, and ultimately overturning into the stream to renew the process—peculiarities never observed elsewhere, and in fact impossible in the ever changing surface of cold-water streams.

FOSSIL FORESTS.

The explorations of each successive year greatly add to our knowledge of the known area, the magnitude and the marvels of the fossil forests of the Amethyst Mountain, East Fork, and Soda Butte regions. There the slow but ceaseless erosion of the frosts and storms of an Alpine clime expose bas-relief views of gigantic trees standing—except the front roots and branches—just as they grew, or lying as crushed and buried in the now towering cliffs of basaltic lava, and the storm-strewn fragments of primeval forests containing opal, onyx, or chalcedony caskets of brilliant amethyst and other crystals, unique and priceless, eagerly sought and carefully preserved in the cabinets and the museums of every civilized land.

NOTABLE RELATIVE POSITION OF VARIOUS HOT SPRING REGIONS.

I have never heard a word or read a sentence upon the subject, but my constantly increasing knowledge of the geyser and other hot spring regions renders more evident the notable relative location of the various basins, terraces, and plateaus. Careful observance of any good map of these regions will show:

1st. That the interesting Geyser Basin at the southwestern extremity of Shoshone Lake, the Lone Basin, 5 miles above Old Faithful, and the Upper, Midway, and Lower Basins upon the Fire Hole rivers, the Gibbon Basin and Norris Plateau upon the Gibbon, the Obsidian Cañon and Mammoth Hot Springs upon the Gardiner, and the immense deposits of nearly extinct hot springs at its confluence with the Yellowstone and along Bear Gulch, comprising far the largest, most interesting, and important chain of thermal springs in the park; or the world, trend for a distance of fully 60 miles, in one of the roughest of earthly regions, in scarcely a perceptible variation from an air line.

2d. That said line is one of longitude, or nearly due north and south.

3d. That the hot springs in the lower two cañons of the Yellowstone, and at Emigrant Gulch between them, Hunter's and other hot springs along or near Shields River, and the famous White Sulphur hot springs on the Mussel Shell, are nearly a direct extension of said line some 150 miles northward.

4th. The numerous active and extinct hot springs along Snake River

and Jackson's Lake, near the Three Tetons, are an extension of the same line 50 miles south of it, making fully 250 miles of mostly continuous and direct line of geysers or other hot springs, with the Oneida salt and the famous soda springs on the old Emigrant road, near Bear River, 100 miles farther, with only a slight deflection southwesterly, passing in all through portions of Montana, Wyoming, Idaho, and near the borders of Utah.

5th. The outlying hot spring regions do not usually diverge, as roots or branches, from the main line, but uniformly in nearly parallel lines therewith and with each other, as those of the Yellowstone, Cañon Falls and Lake, including the Sulphur Mountain, Mud Volcano, and Heart Lake; another forms the Soda Butte, Pelican Creek, Turbid Lake, and Steamboat Point line of hot springs and sulphur basins.

I cannot doubt that a brief examination of maps and candid pondering over these coincidences will, with most thoughtful men, develop the conviction that these were not the effects of mere chance, but the result of some deep-seated cause or influences. But I am not advancing theories, only recording facts deemed well worthy of able scientific investigation. Although there is now no unexplored portion of the park large enough to hope for the discovery or probability of the formation of other extensive geyser basins, still each individual spring and geyser is slowly but surely changing, and countless numbers will yet be found and formed, to long encourage the explorer, and none can foresee a period of time when geyser eruptions will cease, the desire of thoughtful men to view them wane, or the study of their causes and character fail to be of absorbing interest to the scientists of every land.

ROADS AND BRIDLE PATHS.

This season's explorations clearly show an excellent trail and fair wagon-route from the foot of Yellowstone Lake via the east fork of Pelican Creek to the Stinkingwater Pass, towards the Big Horn Valley, doubtless destined to become a summer route of access to the park from all those regions, as soon as occupied by white men, and ultimately for the most of Wyoming Territory, in which the park is mainly situated. Much of interest was this year learned of the region toward the Two Ocean Pass and Wind River Valley; but nothing to justify present expenditures upon a route mostly through impenetrable forests or snowy passes, totally uninhabited and mainly without the park. The Pelican Creek route, from the Soda Butte to the foot of Yellowstone Lake, although passable for a trail, and possessing much interest as traversing the fossil forests and sulphur basins, is still too elevated to anticipate a road in the near future.

Few trails or roads anywhere, for its length and cost, will possess the present or future interest of that past the Great Cañon and falls of the Middle Gardiner River.

Careful and continuous observations from all the surrounding landmarks confirms my conviction that the route which I explored late last year, overlooking the Grand Cañon of the Yellowstone through the eastern spurs of Mount Washburn, instead of over it, near the summit, as at present, is the true one, for either bridle-path or wagon-road, and only untimely snows prevented the completion of a trail there the past season.

It has not been deemed advisable to attempt to open the Great Cut-off Pass, which I explored in 1877, from the east fork to the main Yellowstone, via the Stillwater, until there are fewer Indians and more white men along it.

BOUNDARIES OF THE PARK.

The earnestness with which I have constantly urged the survey of the boundary line between the Territories of Wyoming and Montana is fully justified by its results. As anticipated, it has greatly assisted in restraining lawlessness within and adjacent to the park, and in checking the influx of ranchmen upon the southeastern border of the Crow Indian Reservation and determining the true location of the mining camps across the Yellowstone, from the main portion of the park where the Crow Indians seldom go, never remain long, or molest white men. This boundary survey of Mr. R. J. Reeves also clearly shows, that while the mines and smelting works at the head of Clark's Fork and Soda Butte are within the park (unless east of it), all of them, as well as those of Crevice and Bear Gulches, are wholly in Montana. In fact, it is as anomalous as fortunate that while Montana embraces all the mines of gold, silver, lead, and copper yet prospected or likely to ever be found within the park, so near the territorial boundary is that between the metamorphic mineral-bearing rocks and the igneous or lava and hot spring formations, that Wyoming embraces every geyser or other hot spring, hot spring terrace, cone, or cavern, obsidian mountain, fossil forests, or other wonders or objects of interest for which the park was dedicated, and is or ever will be desirable. With the proverbial uncertainty of mining camps, those which now appear moderately promising may not prove permanently successful; but beyond question there is sufficient mineral of various kinds to encourage continuous prospecting, and a mining population with tastes, habits, and organizations so directly antagonistic to the necessarily peculiar laws, rules, regulations, and management of a national health and pleasure resort, that complications alike unpleasant, unprofitable, and unsafe for all parties will be unavoidable and constant; while the unnatural and unnecessary appendage of a less than 3-mile strip of Montana Territory remains attached to the park, otherwise situate wholly within the Territory of Wyoming. Hence, as in my previous reports, and the conflicting boundary section of this, I again urge the now more evident and urgent necessity of changing the northern and western boundaries of the park so as to conform to those of Wyoming; my thorough explorations clearly showing that there are no wonders adjacent to it upon the west, and hence (as above stated) that it embraces all which is desirable to retain within the park. This would also give us the two most important lines already established, marked, well known, and recognized by all parties, without cost to the park, and by placing it wholly within one Territory simplify its present and future management.

Two brief sections comprising the act dedicating the Yellowstone National Park contain (save two appropriations of \$10,000 each for its protection and improvement) all the legislation to be found regarding it. (See Revised Statutes of the United States, p. 453.)

That it was a wise and timely act, conferring enviable fame upon the scientists who planned, the Congress which passed, and the President who ratified it, enduring benefit to the people, and glory to the nation owning this peerless heritage of wonders, few intelligent men of our own or of other lands will now question. But, like other hasty acts of legislation in an emergency, time and experience have revealed its omissions and its defects, rendering evident the necessity for slight changes in the boundaries of a then mainly unexplored region, and also additional legislation to render plain and practical the requisite discretionary powers of the honorable Secretary of the Interior and his superintendent in en-

forcing their necessarily anomalous laws, rules, and regulations for the proper management of the largest, most interesting, and important, doubtless soon the most popular, health and pleasure resort upon our globe.

During the past season Mr. N. W. Comfort and wife safely drove a team with trail wagon and 400 head of cattle from Oregon via Henry's Lake and our road through the park to the Lower Yellowstone Valley, and we had the use of two milch cows at the Mammoth Hot Springs of J. Beatie for the summer pasturage of his herd of some 300 cattle upon the Black Tail.

Vandalism of the inimitable geyser and hot spring formations is greatly checked, and with an active, faithful assistant at our house in the Upper Geyser Basin during the greatest influx of tourists each season and the desired laws and local assistance will, I trust, leave little future cause of complaint.

PROTECTION OF ANIMALS.

So with indigenous animals. I have not allowed the killing of bison, and so checked the wanton slaughter of elk, deer, sheep, and antelope, mainly for their pelts and tongues, by the mountaineers, that, although grown shy of the usually harmless fusilade of tourists along the main routes of travel, I have, save near the Mammoth Hot Springs, seldom failed to find in secluded parks near our roads abundance of game for our largest parties. But as the flesh, if not dragged down and devoured by bear, wolverine, or mountain lion, will keep perfectly, hung up unsalted in the forest, for at least two weeks at any season of the year, there is little wasted, and I am confident these choice animals have increased, rather than diminished, in numbers within the park since my management thereof. But with the rapid influx of tourists and demand for such food this cannot long continue, and hence the more evident and pressing necessity for systematic and permanent protection of all, and domestication of some of the most rare and valuable of animals in the eastern portion of the park by the assistance of the lessees of hotel and ranch sites, as so clearly stated and strongly urged on pages 11, 12, and 13 of my report of 1877, and again on page 10 of that of 1878. In this connection it is gratifying to find that the intelligent members of the legislature of Montana, at its last regular session, enacted the following law:

AN ACT to protect bison in certain counties in Montana Territory.

Be it enacted by the legislative assembly of the Territory of Montana:

SECTION 1. That any person who shall willfully shoot, or otherwise kill, for the period of ten years from and after the passage of this act, any buffalo or bison, within the counties of Madison, Jefferson, Deer Lodge, and Lewis and Clarke, Montana Territory, shall be fined not less than one hundred dollars nor more than two hundred dollars, or imprisoned in the county jail not less two months and not more than six months, or both such fine and imprisonment, at the discretion of the court.

SEC. 2. That the possession of the green hides, or the dead bodies, or any part thereof, of any buffalo or bison, by any person, or persons, within the limits of said counties, shall be taken as *prima facie* evidence that such person, or persons, are guilty of killing the same.

SEC. 3. Any person informing on any person violating the provisions of section one of this act shall, upon the conviction of such person, be entitled to one-fourth of the fine collected.

SEC. 4. It is hereby made the duty of the judges of the district courts held in the respective counties of Deer Lodge, Jefferson, and Lewis and Clarke to give in charge to the grand juries of said counties the provisions of this act.

SEC. 5. This act shall take effect and be in force from and after its approval.

Approved February 21, 1879.

If the sagacious leading gentlemen of that thriving Territory deem it necessary and feasible to thus supplement ordinary stringent game laws to preserve a remnant of the buffalo and bison that so recently grazed in countless millions upon the nutritious pasturage of their plains and valleys, should not we make systematic efforts for their protection in the park? If these legislators rely upon such enactments and enlightened public sentiment to save from extermination the remnant of these animals scattered through their elevated mining camps, surely the strong arm of the government, through the honorable Secretary of the Interior and his superintendent and assistants in the park, backed by the lessees of hotel sites, sustained by the united influence of the leading thoughtful men of our own nation and sympathy of the scientists of other lands, should in the native haunts of the remote lake, cliff and cañon girt fossil forest portion of the people's health and pleasure park, the nation's peerless wonder-land, by protection of all and domestication of a portion, perpetuate specimens of these and our other most beautiful, interesting, and valuable indigenous animals when elsewhere found only in the natural histories of extinct species.

SUMMARY.

From the foregoing statement of the season's operations, it is evident that by making an early start the park was reached by the slow circuitous route necessarily taken, a strong party organized, and improvements commenced in good season.

That the month of June was the stormiest ever known in those regions, all of July, August, and early September continuously beautiful, and so dry as to allow extensive forest fires in all those mountain regions; but owing to the ceaseless vigilance of our men in seeing to their camp-fires as well as those of tourists, less damage was done within the park than around it, or than has there heretofore occurred. During the otherwise beautiful autumn were several severe storms of snow, which during October became too deep in the elevated passes for profitable prosecution of improvements, which were, however, continued in the valleys, as far as the limited appropriation of funds at my command would justify, until late in November, and still continued in favorable weather by the three men left well housed, provisioned, and equipped for winter in our block-house at the Mammoth Hot Springs.

The excessive rains of June were utilized in grading the thus softened mountain spurs down the Gardiner, and the continuous fine weather following improved by continuous prosecution of explorations and improvements with most gratifying results.

TOURISTS.

Tourists, including many ladies and children, from various portions of Montana and Idaho, traveled our roads and bridle-paths with their own carriages and wagons or saddle and pack animals. Also, mainly with guides, pack-train, and escort, Generals Sackett and Hazen, Major Brisbin, and many other military gentlemen from our own Army and those of Europe; Messrs. Thompson and Cadwalader, of Pennsylvania; Buckland, of Ohio, and other prominent railroad officials; Professor Geikie, of Scotland, and other noted scientists; Capt. W. S. Johnston and J. J. Broom, of New York; Hobson and Zeigler, of Iowa, and other prominent gentlemen and ladies from various regions, aggregating at least 1,000 persons, safely visited and returned from the park during the past season.

The unanimous opinion of all of those I saw or have learned their views was, they were richly rewarded in novelty, enjoyment, scientific knowledge, and health for their hardships, privations and expenses, and many of them pledged to return with friends upon completion of shorter, cheaper, and more convenient routes of access to the wonderland. These are now rapidly approaching, not only by the extension of the Northern Pacific Railroad westward towards the Yellowstone River and steamboats in ascending it, but more notably by the extension of the Utah Northern Railroad from Ogden, nearly 300 miles, through portions of Utah and Idaho, via Pleasant Valley Pass of the Rocky Mountains, into Montana.

From the nearest approach of this road at Camas Creek, in the Great Snake River lava plain, there is a good, well-traveled road for 60 miles, via Shotgun Pass and Henry's Fork, to its lake, at the head of which the small military summer's camp last season proved, as I have long urged, a perfect protection to the park from Indian raids through this matchless gateway of the mountains. Thence it is some 20 miles of fair road—the five good fords of the Madison in its upper cañon being the main obstacles—to the junction of our roads within the park. It is only 15 miles thence to the Upper Geyser Basin, and present terminus of the road in that direction; but by following the trail this year opened, and which I deem vitally important to complete as a road next year, it is some 100 miles additional, via Shoshone and Yellowstone Lakes, Mud Volcano, Sulphur Mountain, Great Falls, head of Grand Cañon, Mary's Lake, and Lower Geyser Basin, to the junction, and 45 miles additional along our road to the Mammoth Hot Springs. Tourists may thus, in a coach trip of some 250 miles from the railroad, reach and make a circuit of the leading wonders of the park and easily view the remaining objects of interest by short branching roads or bridle-paths. Tourists can then have a choice of returning direct by the junction and Henry's Lake to Camas, or by coach 76 miles to Fort Ellis and Bozeman, and some 200 miles additional coaching to steamboats upon the Yellowstone.

It is also very desirable, for purposes within and without the park, that a road be constructed without delay through the cañon of the East Gardiner and the forks of the Black Tail to that of the Yellowstone, and a heavy and expensive bridge over the main stream, as the old rotten and dangerous Barronette foot-bridge, without approaches for wagons, is the only way for reaching the East Fork, Amethyst Mountain, and Soda Butte portions of the park, or the smelting-works and mining-camps of Soda Butte and Clark's Fork. A road connecting this route via Tower Falls, Grand Cañon, and Great Falls of the Yellowstone, with the Mary's Lake route at Sulphur Mountain is very desirable, but too rough and expensive to hope for more than a bridle-path in the immediate future. With an appropriation sufficient to complete these improvements within the park next season, not only are these railroad and steamboat facilities assured by a line of coaches through the park, connecting them, but also propositions from able and desirable parties for leasing sites and speedy construction of commodious hotels, bath-houses, and other conveniences at the Mammoth Hot Springs, Geyser Basins, and other points of greatest interest.

There are now pending propositions for a hotel site at the Mammoth Hot Springs, foot of Yellowstone Lake, and for a steamboat upon the lake, and also a hotel and bathing-houses at the Cold Soda Butte Medicinal Springs, traditionally famous for marvellous cures of jaded and saddle-galled horses and sick or wounded Indians, and now little less noted among the roving mountaineers as second only to the Arkansas Springs

as a specific for the same diseases. As the lessee of at least the Soda Butte site should also be a keeper of the wild and the domesticated animals indigenous to the park, and several if not all of the other lessee government agents within certain prescribed districts, to check vandalism and assist the superintendent in enforcement of necessary laws and regulations for the proper management of the park, great care and deliberation are requisite to secure parties of known responsibility, integrity, and other qualifications to thus assist in retaining intact the natural scenery, animals, and wonders of the park, properly construct and conduct hotels for the accommodation of tourists, and keeping the property insured against fire, to ultimately revert to the government for releasing. This assures immediate coach connection with civilization, convenience for tourists, and ultimate self sustaining character of the park, in a shorter time and at less expense than ever promised, or even anticipated, by the most enthusiastic friends of the peerless wonder-land.

P. W. NORRIS,

Superintendent of the Yellowstone National Park.

Hon. CARL SCHURZ,

Secretary of the Interior, Washington, D. C.

. APPENDIX.

Weather record kept in the Yellowstone National Park during the season of 1879, mainly at the Mammoth Hot Springs. Latitude, 44° 59' north; longitude, 110° 42' west; elevation, 6,450 feet.

Location.	Date.	Sunrise.	Noon.	Sunset.	Remarks.
1879.					
Mammoth Hot Springs	June 12	50	63	54	Rain and sleet storm.
	June 13	52	64	58	Cloudy.
	June 14	48	65	57	Cloudy, and sleet squalls; NW.
	June 15	44	60	55	Cloudy.
	June 16	48	55	50	Fair, but gusts of wind SW.
	June 17	50	60	55	Fair.
	June 18	51	62	58	Rainy.
	June 19	53	65	60	Heavy winds.
	June 20	53	67	53	Clear.
	June 21	42	72	67	Showery from the NW.
	June 22	48	74	60	Clear.
	June 23	44	75	46	Showery from NW.
	June 24	45	62	50	Do.
	June 25	48	65	50	Do.
	June 26	36	68	50	Heavy rain-storm, NE.
	June 27	40	74	50	Clear.
	June 28	60	78	60	Do.
	June 29	50	80	61	Showery; SW.
	June 30	50	54	50	Rainy day; NW.
Average of the 18 days taken in June.		43	70	57	Fair days, 6; prevailing wind NW.
Mean :			57		
Mammoth Hot Springs	July 1	32	60	60	Clear; ice in a. m.
	July 2	45	58	50	Clear.
	July 3	48	70	48	Do.
	July 4	62	78	50	Clear; wind SW.
	July 5	62	80	54	Clear.
	July 6	48	74	60	Do.
	July 7	60	82	60	Do.
	July 8	60	84	70	Do.
	July 9	60	80	75	Do.
	July 10	60	80	61	Clear; wind SW.
	July 11	61	78	58	Clear.
	July 12	60	81	65	Cloudy; wind SW.
	July 13	62	80	65	Cloudy.
	July 14	59	80	61	Do.
	July 15	58	84	59	Fair.
	July 16	60	82	60	Showery; thunder; wind SW.

Weather record kept in the Yellowstone National Park, &c.—Continued.

Location.	Date.	Sunrise.	Noon.	Sunset.	Remarks.
1879.					
Mammoth Hot Springs	July 17	61	82	65	Clear.
	July 18	58	80	60	Do.
	July 19	60	75	70	Do.
	July 20	61	81	60	Do.
	July 21	60	86	70	Clear; wind S.
	July 22	60	84	70	Clear.
	July 23	60	68	60	Showery; NW.; mercury fell 14° in one hour.
	July 24	56	68	60	Clear.
	July 25	54	70	60	Do.
	July 26	54	70	61	Do.
	July 27	55	71	60	Fair.
	July 28	54	86	70	Cloudy; wind SW.
	July 29	58	88	72	Clear; wind SW.
	July 30	57	82	70	Clear.
	July 31	56	87	73	Do.
Average of the month		59	80	63	Fair days, 23; prevailing wind SW.
Mean			67		
Mammoth Hot Springs	Aug. 1	45	73	68	Clear.
	Aug. 2	46	78	68	Do.
	Aug. 3	50	82	70	Do.
	Aug. 4	52	78	65	Do.
	Aug. 5	50	75	62	Cloudy.
	Aug. 6	47	74	65	Cloudy; showers.
	Aug. 7	42	75	68	Showers.
	Aug. 8	45	79	67	Clear.
	Aug. 9	50	82	69	Do.
	Aug. 10	55	86	70	Do.
	Aug. 11	48	84	70	Do.
	Aug. 12	45	66	60	Rain: NW.
	Aug. 13	45	72	65	Clear.
	Aug. 14	50	80	70	Clear; SW.
	Aug. 15	45	76	70	Rain; SW. wind.
	Aug. 16	53	81	70	Rain.
	Aug. 17	53	72	66	Clear.
	Aug. 18	54	78	70	Rain.
	Aug. 19	50	75	70	
	Aug. 20	56	78	68	Clear.
	Aug. 21	53	74	61	Do.
	Aug. 22	54	73	60	Do.
	Aug. 23	55	72	61	Do.
	Aug. 24	52	70	62	
	Aug. 25	45	80	70	Clear.
	Aug. 26	58	82	74	Showery; SW. wind.
	Aug. 27	58	78	70	Showery.
	Aug. 28	52	62	70	Rain; NW.
	Aug. 29	42	50	48	Clear; NW.
	Aug. 30	38	60	50	Clear.
	Aug. 31	42	65	58	Do.
Average of August		49	74	69	Clear days, 24; prevailing wind SW.
Mean			64		
AUGUST—EN ROUTE TO THE GEYSERS.					
Terrace Pass	Aug. 1	45	70	60	Clear; wind SW.
Willow Park	Aug. 2	45	71	62	Do.
	Aug. 3	50	70	60	Do.
	Aug. 4	48	60	60	Showery; NW.
Obsidian Cañon	Aug. 5	50	70	61	Clear; SW.
	Aug. 6	56	70	56	Showers; SW.
Beaver Lake	Aug. 7	56	71	60	Clear; SW.
	Aug. 8	58	80	61	Do.
Lake of the Woods	Aug. 9	40	82	58	Do.
	Aug. 10	40	80	58	SW.
Norris Plateau	Aug. 11	32	80	55	Do.
Mount Norris	Aug. 12	30	80	60	Snow-squalls on mountain; NW.
	Aug. 13	32	81	62	Clear; SW.
Gibbon Cañon	Aug. 14	31	84	50	Do.
	Aug. 15	32	60	50	Fair; SW.
Mount Schurz	Aug. 16	40	61	51	Snow-squalls; NW.
Average of 16 days en route		43	73	54	Clear days, 11; snow, 2; wind SW.
Mean			57		

Weather record kept in the Yellowstone National Park, &c.—Continued.

Location.	Date.	Sunrise.	Noon.	Sunset.	Remarks.
1879.					
Mammoth Hot Springs	Sept. 1	44	70	55	Clear.
	Sept. 2	45	71	57	Do.
	Sept. 3	48	72	58	Do.
	Sept. 4	43	68	68	Shower; NW. wind.
	Sept. 5	45	64	50	Clear; SW. wind.
	Sept. 6	44	45	70	Snow-squall; NW.
	Sept. 7	42	76	70	Clear; SW.
	Sept. 8	44	78	75	Rain.
	Sept. 9	60	50	50	Snow; frost at night; NW.
	Sept. 10	40	50	45	Frost at night; NW.
	Sept. 11	25	50	50	Severe frost; NW.
	Sept. 12	30	50	50	Do.
	Sept. 13	30	55	45	Severe snow; NW.
	Sept. 14	25	60	50	Clear.
	Sept. 15	40	50	45	Clear; SW.
	Sept. 16	40	70	51	Clear.
	Sept. 17	35	72	50	Do.
	Sept. 18	40	74	42	Do.
	Sept. 19	40	70	51	Do.
	Sept. 20	41	72	52	
	Sept. 21	40	71	60	Not kept.
	Sept. 22	39	69	58	
	Sept. 23	35	70	61	
	Sept. 24	32	60	61	
	Sept. 25	40	60	61	
	Sept. 26	39	61	60	
	Sept. 27	40	61	59	
	Sept. 28	40	60	40	
	Sept. 29	35	40	41	
	Sept. 30	32	45	40	
Average of September.		39	60	53	Clear days, 15; prevailing wind SW.
Mean			51		
Mammoth Hot Springs	Oct. 1	32	50	40	Clear; NW. wind.
	Oct. 2	30	50	45	Clear.
	Oct. 3	30	50	50	Snow-squalls.
	Oct. 4	40	50	45	Do.
	Oct. 5	40	51	41	
	Oct. 6	35	45	35	
	Oct. 7	37	47	38	
	Oct. 8	37	48	37	Snow 2 feet deep.
	Oct. 9	40	49	39	
	Oct. 10	32	40	30	
	Oct. 11	33	50	31	Snow-squalls.
	Oct. 12	32	45	30	
	Oct. 13	34	47	30	
	Oct. 14	30	46	32	
	Oct. 15	31	45	30	
Willow Park	Oct. 16	34	47	31	
Norris Plateau	Oct. 17	30	55	30	
Gibbon Cañon	Oct. 18	32	70	30	
Geyser Basin	Oct. 19	30	50	31	
East Fire Hole	Oct. 20	34	40	35	
	Oct. 21	30	55	30	
	Oct. 22	28	50	31	
Mud Volcano	Oct. 23	26	60	30	Severe snow-squalls.
	Oct. 24	22	45	32	
	Oct. 25	20	50	31	
Sulphur Mountain	Oct. 26	25	60	29	
Cañon Creek	Oct. 27	28	65	30	Clear.
Obsidian Cañon	Oct. 28	33	68	34	Do.
Willow Park	Oct. 29	27	65	40	Do.
Mammoth Hot Springs	Oct. 30	32	60	41	Do.
	Oct. 31	32	61	41	
Average of the month		22	52	30	Prevailing wind W.; cloudy and snowy most of the month.
Mean			35		
Mammoth Hot Springs	Nov. 1	20	65	41	Clear; wind SW.
	Nov. 2	21	58	40	Clear; SE.
	Nov. 3	32	58	48	Do.
	Nov. 4	32	50	40	Clear; E. gale.
	Nov. 5	40	48	49	Snow; SE.
	Nov. 6	48	34	32	Do.

Weather record kept in the Yellowstone National Park, &c.—Continued.

Location.	Date.	Sunrise.	Noon.	Sunset.	Remarks.
1879.					
Mammoth Hot Springs	Nov. 7	20	35	22	Clear; SE.
	Nov. 8	9	30	21	Snow; SE.
	Nov. 9	21	32	21	Clear; SE.
	Nov. 10	20	30	35	Snow-squalls and SE. gale.
	Nov. 11	30	38	21	Snow; SW. gale.
	Nov. 12	20	38	26	Snow; SW.
	Nov. 13	21	24	21	Snow-squalls; gale in p. m., SE.
	Nov. 14	21	33	28	Snow; gale SW.
	Nov. 15	21	28	26	Snow-squalls SE.
	Nov. 16	21	34	22	Clear; wind SW.
	Nov. 17	8	36	22	Clear; W.
	Nov. 18	20	34	40	Clear; wind SE.
	Nov. 19	20	50	40	Clear; SE.
	Nov. 20	21	54	41	Clear; wind SE.
	Nov. 21	22	58	40	Clear; SE.
	Nov. 22	24	64	40	Clear; wind SW.
	Nov. 23	26	48	41	Clear; W.
	Nov. 24	27	46	36	Clear; wind SE.
	Nov. 25	32	32	30	Snow; SW. gale.
	Nov. 26	12	28	6	Snow-squalls; SW. gale.
	Nov. 27	— 2	33	12	Do.
	Nov. 28	18	28	24	Do.
	Nov. 29	26	34	33	Do.
	Nov. 30	34	36	36	Snow-squalls; SE.
Average of the month		23	40	31	Clear days, 13; balance of month mainly gales; wind SE.
Mean			31		
Mammoth Hot Springs	Dec. 1	33	40	32	Direction of wind, E.
	Dec. 2	34	38	34	Snow; SE.
	Dec. 3	34	40	34	2 inches snow; SE. and NW.
	Dec. 4	18	46	24	1 inch snow; SE.
	Dec. 5	17	40	20	Do.
	Dec. 6	16	28	18	2 inches snow; ESE. gale.
	Dec. 7	19	34	22	3 inches snow; ESE. gale.
	Dec. 8	10	14	6	3 inches snow; NW. gale.
	Dec. 9	3	16	8	Clear; south.
	Dec. 10	6	38	8	Do.
	Dec. 11	8	12	10	4½ inches snow; SW. gale.
	Dec. 12	9	14	8	5½ inches snow; gale.
	Dec. 13	10	14	16	4 inches snow; NW. gale.
	Dec. 14	15	20	9	3 inches snow; NW.
	Dec. 15	8	16	12	Clear; NW. gale.
	Dec. 16	6	12	9	Clear; SE. gale.
	Dec. 17	0	8	6	1 inch snow; SE. gale.
	Dec. 18	4	12	9	Clear; SE.
	Dec. 19	6	10	9	SW. gale.
	Dec. 20	14	26	18	Clear; SW. gale.
	Dec. 21	16	25	14	Do.
	Dec. 22	18	24	16	12 inches snow; SE.
	Dec. 23	19	6	15	15 inches snow; SE. gale.
	Dec. 24	32	2	11	14 inches snow; SE.
	Dec. 25	18	0	0	Cloudy; SW.
	Dec. 26	12	30	20	SE. gale.
Average of the month		12	18	12	66 inches snow; clear days, 6; prevailing wind SE.; gale, 14 days.
Mean			14		

The above records strengthen my previous impressions that the park is for its elevation less a severely cold than a moist and stormy portion of those mountain regions, save during a short but beautiful summer. But with the hoped-for instruments and assistance from the Signal Service, we may safely rely upon a greater knowledge and more satisfactory showing of the climate of the park in the next annual report.

ROUTES AND DISTANCES TO THE YELLOWSTONE NATIONAL PARK.

Assuming Chicago to be the general point of divergence for the great Northwest, routes and distances are properly estimated therefrom.

The main routes of access to the park are still the southern, or railroad, and the

northern, or river routes, both of which, as indicated in my report of last year, have been materially improved and shortened during the past season.

As no route within the park or any of its trail or wagon-road approaches have ever been measured, the distances, as given of them, are only careful estimates.

SOUTHERN ROUTE.

	Between points.	Total.
	Miles.	Miles.
Chicago via various railroad lines to Omaha	493	-----
Union Pacific Railroad to Ogden	1, 031	1, 524
Utah Northern Railroad to Camos	241	1, 765
Wagon road and perhaps coach line during the season:		
Camos to—		
Shotgun Pass	20	-----
Henry's Fork	20	40
Livermore's Camp	10	50
Henry's Lake	15	65
Taughee's Pass of main divide	4	69
South Fork of the Madison	4	73
West line of the park	7	80
Cañon of the Madison to mouth of the Gibbon	8	88
Junction of road to Mammoth Hot Springs	5	93

NORTHERN ROUTE.

Chicago via various railroad lines to Saint Paul	409	-----
North Pacific Railroad to Bismarck	469	878
North Pacific Railroad to the terminus	125	1, 003
Coach to Yellowstone River	125	1, 128
Steamboat to mouth of Big Horn	130	1, 258
Coach to Bozeman	205	1, 463
Coach to Bottler's	40	1, 507
Coach to north line of the park	30	1, 537
Coach to Mammoth Hot Springs	6	1, 573

ROUTES WHOLLY WITHIN THE PARK.

ROAD TO THE GEYSERS.

Headquarters at Mammoth Hot Springs to—		
Terrace Pass	3	-----
Rustic Falls on the West Gardiner	3	6
Indian Creek	3	9
Willow Park	6	15
Obsidian Cliffs	2	17
Lake of the Woods	4	21
Norris Geyser Plateau	7	28
Geyser Creek	4	32
Monument, Geyser Basin	2	34
Lower cañon and falls of the Gibbon	4	38
Cañon Creek	1	39
Junction with the southern route	6	45
Forks of the Fire Hole Rivers	5	50
Lower Geyser Basin	1	51
Midway Geyser Basin	4	55
House in Upper Geyser Basin	5	60

TRAIL AND PROPOSED ROAD TO THE YELLOWSTONE LAKE AND FALLS.

	Between points.	Total.
	Miles.	Miles.
House in Upper Geyser Basin to—		
Cascades of the Fire Hole Rivers.....	3	.....
Norris Pass of the main divide.....	5	8
Shoshone Creek, 2 miles from the lake.....		
Columbia River and Pacific waters.....	2	10
Two Ocean Pond.....	5	15
Hot Springs on Yellowstone Lake.....	7	22
Cliffs on lake.....	8	30
Bridge Creek Bay.....	12	42
Foot of Yellowstone Lake.....	5	47
Mud Volcano.....	8	55
Sulphur Mountain.....	4	59
Alum Creek.....	3	62
Great Falls of the Yellowstone.....	3	65
Return to Alum Creek.....	3	68
Hot Sulphur Springs.....	11	79
Mary's Lake.....	3	82
Cold Spring Creek.....	9	91
Forks of the Fire Hole River.....	7	98

MIDDLE GARDINER TRAIL.

Mammoth Hot Springs to—		
The West Gardiner.....	2	.....
Falls of the Middle Gardiner.....	2	4
Sheepeater Cliffs.....	2	6
Road to the Geysers.....	1	7

TRAIL TO FORKS OF THE YELLOWSTONE.

Mammoth Hot Springs to—		
Forks of the Gardiner.....	2	.....
Lower Falls of the east fork of the Gardiner.....	1	3
Upper Falls of the Gardiner.....	1	4
Cascades of the Gardiner.....	1	5
Black Tail Creek.....	3	8
Dry Cañon or Devil's Cut.....	7	15
Pleasant Valley.....	3	18
Forks of the Yellowstone.....	2	20

MOUNT WASHBURN TRAIL.

Forks of the Yellowstone to—		
Tower Falls.....	3	.....
Snowy spur of Mount Washburn.....	6	9
Dunraven's Pass.....	3	12
Cascade Creek.....	4	16
Great Falls of the Yellowstone.....	4	20

GRAND CAÑON TRAIL.

Tower Falls to—		
Ball's Lake.....	3	.....
Old Ruin.....	2	5
Grizzly Pass.....	2	7
Grand Slide.....	3	10
Brink of the Grand Cañon.....	4	14
Great Falls of the Yellowstone.....	3	17

MINERS' TRAIL TO THE CLARK'S FORK MINES.

	Between points.	Total.
Forks of the Yellowstone to—	<i>Miles.</i>	<i>Miles.</i>
Crystal Creek.....	4	.....
Amethyst Creek.....	4	8
Ford of East Fork of the Yellowstone.....	3	11
Soda Butte Medicinal Springs.....	2	13
Pebble Creek.....	3	16
Silver Smelter, Clark's Forks Mines, Index Peak.....	10	26
Index Peak.....	5	31

FOSSIL FOREST TRAIL.

Ford of East Fork of the Yellowstone to—		
Hot Spring Camp.....	2	.....
Fossil Terrace.....	3	5
Bison Summit.....	3	8
Mirror Pond.....	4	12
Brimstone Basin.....	8	20
Forks of Pelican Creek.....	4	24
Yellowstone Lake.....	6	30

STINKINGWATER TRAIL.

Forks of the Pelican to—		
Entrance to pass.....	6	.....
Cañon and pass through the first range.....	5	11

RECAPITULATION OF ROADS AND TRAILS OPENED WITHIN THE PARK.

Roads.

	<i>Miles.</i>
Mammoth Hot Springs to north line of the park, near the Yellowstone.....	6
Mammoth Hot Springs to the Forks of the Gardiner.....	2
Mammoth Hot Springs to West Gardiner.....	2
Mammoth Hot Springs to junction with Henry's Lake road.....	45
Junction on Henry's Lake road to western line of the park.....	13
Junction to house in Upper Geyser Basin.....	15
Forks of the Fire Hole Rivers to Cold Spring Creek.....	7
	90

Trails.

	<i>Miles.</i>
1st. Middle Gardiner.....	7
2d. Forks of the Yellowstone.....	20
3d. Clark's Fork Mines.....	31
4th. Fossil Forrests.....	30
5th. Stinkingwater.....	11
6th. Yellowstone Lake and Falls.....	98
7th. Mount Washburn.....	20
8th. Grand Cañon.....	17
	234

To the southern route the Central Pacific Railroad to California, as well as the Denver Pacific and other railroads to Saint Louis, afford great facilities for the Southern and Southwestern States and Territories, and for the increasing class of scientists and retired military and naval officers, or those upon leave of absence who, while making the grand trip of the world, now annually visit the park.

The northern route has the advantages of cool summer travel upon the great lakes, the Missouri and Yellowstone Rivers, and railroad connections with Manitoba and

other British possessions, and ere long with Oregon, Washington Territory, and the northern route to Asia via the Northern Pacific Railroad.

One of these routes presents the greatest variety of scenery, modes of travel, and somewhat shortest distance: the other the most direct continuous railroad connection, least coach or horseback travel, and consequently requiring the least time, but practically both are convenient and necessary, as most persons with time and means will prefer going one route and returning the other, and no effort will be spared upon my part to prepare the roads within the park and urging others to prepare its approaches, as also to perfect arrangements with the various railroad, steamboat, and coach lines for trip tickets to and throughout the park, probably during the latter portion of the coming season, and certainly the next.

Camp outfit and provisions can be purchased without extortion at Bozeman, Virginia City, Ogden, and elsewhere, and trusty guides with saddle and pack animals at the Mammoth Hot Springs and other points within and adjacent to the park.

Time really necessary to view the leading wonders of the park, ten days, and many more may be enjoyed with benefit: season of the year for a visit, July, August, and early September; cost of trip, although one of the most important considerations with most persons, is, from their divers positions, tastes, and modes of travel, the most difficult to state, even approximately, but will range from \$400 to \$1,000 for the entire expenses of a visit to the mystic wonder-land. The best plan is, as recommended in my last year's report, to make the park the main object and turning point of a season's rambles, visiting at least the Salt Lake and the Yellowstone regions upon the outward or return routes.

There was no annoyance by Indians during the past season within or near the park, and no present prospect of any during the next.



CROW INDIAN RESERVATION

YELLOWSTONE NATIONAL PARK

PACIFIC

Department of the Interior.

COMPILED FROM THE MAPS OF W. HAYDEN AND OF P. W. NORRIS
AND FIELD NOTES OF THE EXPLORATIONS AND
IMPROVEMENTS OF P. W. NORRIS AND SURVEYS OF
R. REEVES IN 1879.

BY P. W. NORRIS SUPERINTENDENT OF THE YELLOWSTONE
NATIONAL PARK





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